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THE BRICKBVILDER

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THE BRICKBUILDER.

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ADVERTISING.

Advertisers are classified and arranged in the following order: —

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Advertisements will be printed on cover pages only.

THE old saying in regard to the expensive character of lessons which are acquired by experience certainly does not seem to be applicable to some phases of recent American architecture. On the contrary, our architects have had several opportunities to acquire most valuable lessons by experience which has come easily in a pleasant form and has left a lasting imprint. The Buffalo Exposition is the latest of these experiences and promises to be extremely valuable in its lessons. The buildings which have been projected at Buffalo are similar in character to those which were erected at Chicago, in that they are practically huge plaster of Paris models; and in so far as they are of a temporary nature, they have afforded opportunities for experiments which we would hardly dare attempt in more serious constructions, the Buffalo buildings, however, differing from the Chicago constructions in the lavish use of color. It is too early yet to say whether we, as a nation, will ever use color in a natural, spontaneous manner; but beyond any doubt the Buffalo Exposition buildings will set a pace which we will have to live up to to a very considerable extent, and it is doubtful whether we will ever be again as easily satisfied with pure white plaster as we were in the Court of Honor at Chicago. The Buffalo fair has a riot of rich tones and polychromatic architecture. Considered as sketches, as artistic attempts, the buildings are eminently satisfactory and reflect the greatest credit upon their designers. We believe this same sentiment will be echoed by the visitors to the fair next spring, and the lavish coloring will remain as a characteristic of this Pan-American Exposition. The throwing off of the restraint which is so hard to avoid in public architecture, the development of the imaginative qualities, the opportunities for breadth and vigor in treatment of details,— make this an object-lesson by which the whole profession, no less than the architects immediately concerned, will be sure to profit. There is, however, just one word of caution which we feel constrained to voice. We have had a good many of these temporary staff structures of late years. So long as they are regarded as sketches, as merely studies, their influence cannot fail of being good; but we must not take them too seriously, nor assume in our permanent work all of the freedom or eclecticism which is so delightful in the temporary buildings. In detail, as well, we can permit ourselves a great license in a building, which, if it is wrong, will not leave a lasting mark on our architecture, and we can enjoy a sketchy, off-hand treatment of details both in mass and in its parts which would not pass muster for permanent work, but the danger would be that not only our younger men who receive strong impressions from this Exposition, but also the elders who will have awakened within them the delight of imaginative architecture, may be tempted to consider too seriously these ephemeral structures. It is our belief that the present acknowledged decadence of modern French architecture is ascribable in no inconsiderable degree to the license which has apparently been considered not only permissible, but desirable, in the designing of the French Exposition buildings. The entrance arch of the present Paris Exposition certainly is the culmination of the tendencies which began way back in 1855. Our Exposition buildings thus far have been worthy representatives of the best efforts of our own architects. The lessons have been learned and are constantly being applied; but we must take all our experience with reserve, and it would be a sorry day for American architecture if all our public buildings were to be designed in the lavish manner which is so fascinating in Exposition structures.

SOMETHING less than two years ago, steel made a rapid and unprecedented jump in price, going far beyond any previous quotations. Whether this rise was due to an unexpected large demand, or was the result of combination among steel manufacturers, we are unable to determine, but we do know it had an immediate effect in checking building operations and postponing for a considerable period the prosperity in structural work which we are all anxious to witness. Within the last six months

steel has returned very nearly to normal quotations. A good illustration of the fluctuation in prices is afforded by the recent acceptance of a bid of $2,411,000 for the new bridge over the East River in New York. Four months ago the lowest bid for the same work was $3,321,000. The difference between the two represents a saving of nearly $1,000,000. In very many cases, owing to the greatly increased proportion of steel which enters into modern buildings, a fluctuation in price, such as is represented by the above figures, would be sufficient to turn a losing investment into one which would pay very fairly on the amount of capital involved. It is to be hoped that it will be many years before this country will witness such extraordinary prices, for so essential a material, as prevailed up to a very few months ago.

"THE BRICKBUILDER" COMPETITION. V.

A VILLAGE BANK TO BE BUILT OF BRICK OR TERRA-COTTA.

PROGRAM.

A BUILDING, to cost in the vicinity of twenty-five or thirty thousand dollars, is to be built facing a village green, around which on opposite sides of the square will be grouped a public library, the village church, the schoolhouse, and the court-house. The building is to be one story in height and is to be used for a small bank. The interior is to contain a main banking room across the front, which is to measure not less than 24 ft. in width by 15 ft. in depth. In the rear will be a small consulting room on one side, about 8 by 12 ft., and a directors' room, 12 by 16 ft., in the center, the two occupying the full width of the banking room, with a small ell to contain the vault, accessible from either the directors' room or the banking room, and a small lavatory. The banking room is to be preceded by a small portico. For the purpose of this competition only the sketch design of the exterior need be considered. The design is to follow substantially the above-described plan, such variations, however, being permissible as are desired to obtain a picturesque treatment. The design is to be of such nature as is suitable for being carried out in burnt-clay products. The height of the story in the main room may be varied, but should not be less than 12 ft. in the clear.

DRAWINGS REQUIRED: A perspective sketch design, made in black ink with no wash work, upon a sheet measuring 15½ ins. wide by 10 ins. high. The drawing is to be signed by a *nom de plume*, or device, and accompanying the same is to be a sealed envelope with the *nom de plume* on the exterior and containing the true name and address of the contestant.

Drawings are to be delivered, flat, at the office of THE BRICKBUILDER, 85 Water Street, Boston, on or before Dec. 1, 1900. For the three designs placed first, THE BRICKBUILDER offers prizes of twenty-five, fifteen, and ten dollars, respectively. All premiated drawings are to become the property of THE BRICKBUILDER, and the right is reserved to publish any and all drawings submitted. Mr. C. H. Blackall, of Boston, has kindly consented to judge and criticize this competition.

THE CHURCH OF SAN AMBROGIO, MILAN, ITALY.

AMONG the round-arched Lombard churches of north Italy none occupies a more prominent place historically than San Ambrogio of Milan. Founded in the fourth century by St. Ambrose, Bishop of Milan, on the ruins of a temple of Bacchus, rebuilt in the ninth century by Bishop Anspertus, aided by the munificence of King Louis the Pious, and again almost entirely rebuilt in the twelfth century with its galleries and atrium, its walls have witnessed the coronation with the "Iron Crown" of many a Lombard king and German emperor. The "Iron Crown" which takes its name from a thin band of iron said to have been forged from one of the nails of the true cross, and enclosed by its hoop of gold, has been kept at Monza since the time of Frederick Barbarossa, but the pillar at which the coronation oath was taken is still preserved under the lime trees in the piazza, and the church is a perfect museum of ecclesiastical antiquities. The high altar, with its silver and enamel decoration of the ninth century, remains intact, together with its beautiful canopy, and the crypt contains the tombs of Saints Ambrose, Protasius, and Gervasius. The church also contains early mosaics and several frescoes. After the massacre of Thessalonica in 389 the gates of this church were said to have been closed by St. Ambrose against the cruel Emperor Theodosius.

The fine atrium which separates the building from the noisy street and gives it the quiet seclusion so necessary for a place of worship seems to have preserved the architectural characteristics of the original building. Constructed of brick, the simple forms of the columns and arcades, and the five great but unequal arches of the façade, relieved against the deep shadows of the loggia, make, with the two guardian towers, a most dignified and solemn, though severe, architectural composition. A simple but strongly corbelled cornice runs around the atrium and up the slopes of the gable, in which no clear-story is expressed. The capitals of the columns are of the curiously carved, blocky style common in Romanesque work.

Altogether the entrance façade of San Ambrogio is an agreeable change from the too much neglected west fronts of many Italian churches. With the architects of north Italy the arcade was the favorite motif of decoration. Used in successive stories as at Pisa, or in single galleries only as at Piacenza, or with columns omitted and arches reduced to the size of successive units of a string-course as in dozens of other Italian churches, it gives a sparkling and brilliant shadow which a flat cornice never attains, and it became the most commonly used exterior decoration in the northern part of the peninsula. Its effect, however, was seldom dignified, and to the northern eye, unaccustomed to the brilliant coloring and sunshine of the south, even appeared at times trivial. This defect is splendidly avoided at San Ambrogio. Nothing can exceed the solemnity and depth of the great arches which overlook the atrium, and the simple and majestic lines of the piers and roof, with their guardian towers, which seem to correspond so well with the grim memories of the German tyrants who assumed the imperial power under their gloomy shades.

The Designing and Planning of Railway Stations. II.

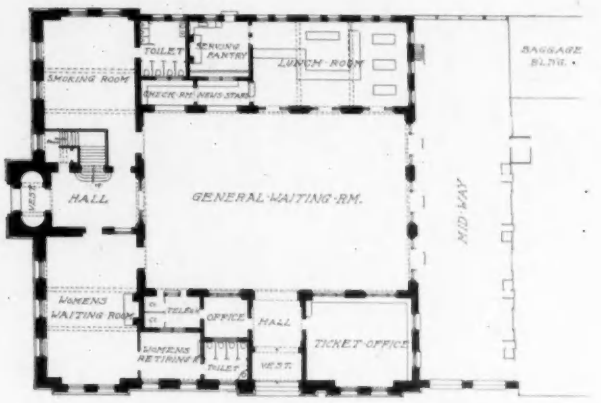
BY ALFRED HOYT GRANGER.

IN a former paper on the planning of railway stations I offered some suggestions as to arrangement, location, and architectural treatment of small suburban and country stations. It is my purpose now to apply the same line of thought to the larger city stations.

There are but three general treatments of plan: the head house, with perhaps a wing flanking the tracks, for baggage, freight, and express; the side house, which is the suburban station on a large scale; and the "island" station, situated between the tracks.

Of the first character is the station at Minneapolis, Minn., for the Chicago, Milwaukee and St. Paul Railway. Though this station is used by but one corporation and is very small in comparison with such terminals as the Reading at Philadelphia, and the new South Terminal at Boston, its plan contains the necessary features for a city station, and from its very smallness is more easily to be studied.

The building stands upon a corner of two principal streets, with ample approaches from each. The main feature is, of course, the general waiting room, which occupies the court of the building. It is two stories in height, and lighted from the ceiling as well as from the end toward the tracks, this end being almost entirely of glass. The interior treatment, as shown in the photographs, is entirely of brick and terra-cotta, with a wooden ceiling and marble floor. Up to the spring course of the arches the walls are wainscoted with a cream white, dull enamel brick. The terra-cotta trimmings and the walls above this enamel wainscoting are of a golden tone in color, which gives a luminous effect to the interior. Around this inner court are arranged the women's waiting room, women's retiring room, lavatories, check, parcel, and telegraph and smoking rooms, with the ticket office and lunch room placed nearest the train shed, where they are most accessible to the traveling public.



PLAN, C. M. & ST. PAUL RAILWAY STATION, MINNEAPOLIS, MINN.

C. M. & ST. PAUL RAILWAY STATION, MINNEAPOLIS, MINN.
Frost & Granger, Architects.

Between the station proper and the tracks and baggage rooms is a large covered esplanade or "midway," directly accessible to the street. This feature, which is now of almost universal use, prevents confusion in the handling of large crowds. For convenience at times of excessive travel, extra ticket windows should be arranged opening directly upon this "midway."

The baggage and express rooms are always preferably located in a separate building, which must be accessible to the "midway," and in every case should contain, besides necessary baggage and express rooms, a small room for employees and ample lavatories for same.

Although from an architectural standpoint one fine large arch separating the station building from the train shed at the street ends of the "midway" is desirable, it was thought best in this case to use two arches, so as to divide the crowd, the outgoing passengers to pass the extra ticket windows through the opening nearer the station, without conflicting with incoming passengers, who reach the street directly through the archway nearer the train shed.

MAIN WAITING ROOM, C. M. & ST. PAUL RAILWAY STATION, MINNEAPOLIS, MINN.

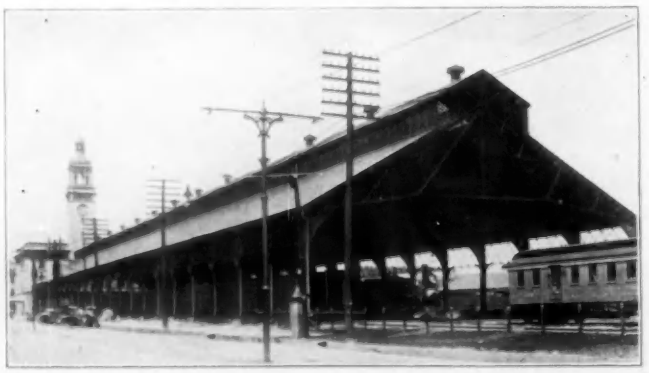
Every city station should be placed far enough back from the street to allow space for cabs and other vehicles without interfering with regular traffic. If this is not possible, then a covered court should be arranged for all cabs and carriages, as has been very happily done in the Baltimore and Ohio station in Chicago.

Each entrance to a city station should be provided with a covered shelter over the sidewalk to protect people entering or leaving carriages. Often an interesting feature can be made of this canopy by treating it as a French marquee, and hanging it from the building by ornamental wrought-iron chains.

The upper stories of the Minneapolis station are devoted to offices and emigrant accommodations. The waiting rooms for emigrants are directly accessible to the "midway" by exterior stairways.

The exterior treatment of this station is broad and simple. From the fact of its being an office building as well as railway station, it was deemed necessary to design a clock tower to give the building more character as a station, a feature which we do not always recommend.

The first story is treated very simply in granite, with large, square openings and no ornamentation beyond a molded water-table and string-course, with some bold moldings around the entrance archways, which, being of equal importance, are treated alike. Above the bold string-course crowning the first story the materials are pressed brick and terra-cotta, similar in tone and of a golden brown; the roof and upper portion of the tower being of copper.



C. M. & ST. PAUL RAILWAY STATION, MINNEAPOLIS, MINN.

A far different problem is that of the Union Pacific station at Omaha. Here the tracks are in the valley between two hills, connected by a broad viaduct 25 ft. above the track level.

All the roads from the East using this station terminate at Omaha; and for the convenience of passengers changing from the Eastern to Western bound trains, or *vice versa*, it was deemed best to locate all waiting rooms, etc., at the lower level, leaving only a large vestibule and check room, with stairway and elevators, at the viaduct level. This great vestibule is treated as an entrance archway, built of pressed brick, deep yellow in tone, with Bedford stone trimmings. The pediment is eventually to be richly carved, and to be surmounted with a bronze eagle standing upon a globe.

The whole of the station proper is upon the track

FIREPLACE, LADIES' WAITING ROOM, C. M. & ST. PAUL RAILWAY STATION, MINNEAPOLIS, MINN.

level, and is directly accessible to the streets at this level, and also from the viaduct by an inclined roadway built by the railroad company.

This station belongs to the side-house class, and the "midway" extends the entire length of the main building and far enough beyond to admit passengers to restaurant and baggage room.

The location of the lunch room, as shown on the plan, is in this case unique, and not in our judgment desirable. It was adopted for the convenience of a very large percentage of the traveling public, who have no occasion to enter the station proper.

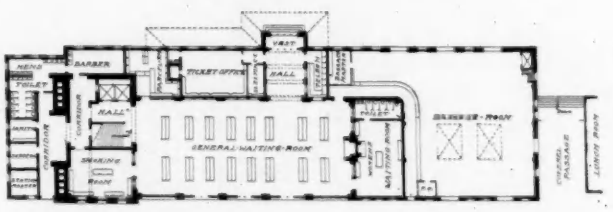
The general arrangement of floor plan is exceedingly simple, and explains itself. The materials used in the main waiting room are marble, brick, and terra-cotta, with a wood and plaster ceiling.

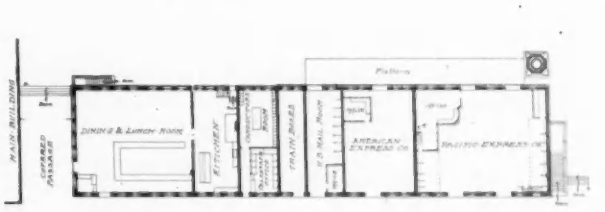
The wainscoting, up to the spring of the arches, is Vermont green marble; the brick and terra-cotta, fawn-color; and all woodwork, birch stained a rich mahogany color. The floors are of marble slabs. It is the ultimate intention to fill the empty panels of the arches with mural paintings, illustrating features of Western Indian life. The treatment of the grand vestibule at the viaduct level is similar to that of the main waiting room (excepting its ceiling, which is a barrel vault concentric with entrance arch), and is, like it, to be ultimately decorated.

Throughout, an effort has been made to plan and build a railway station, and nothing else. The peculiar situation of this station decided the railroad companies to use umbrella sheds connected by a broad causeway, instead of one large covered shed. For many reasons this form of shed is preferable, as it is simple to care for and much more open and cleanly.

The "island" form of station is unusual in a city terminal, though it is to be used in the new stations at Pittsburgh and Nashville. All through trains pass on either side of the station; while trains starting or ending at the point where station is located use stub tracks in a train shed at one end of the building.

UNION STATION, OMAHA, NEB.
Frost & Granger, Architects.

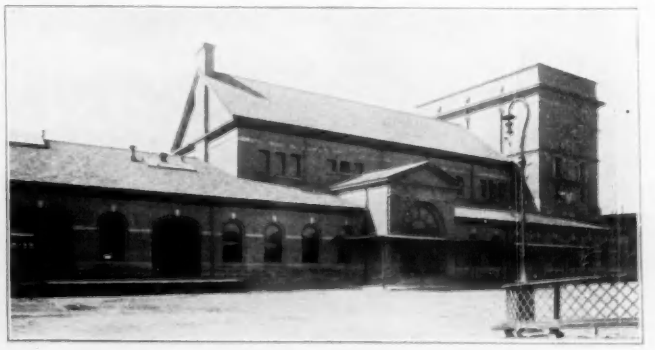




PLAN, UNION STATION, OMAHA, NEB.

In designing any kind of a railway station, large or small, the essential point in plan is to facilitate the handling of large crowds of people and large quantities of baggage, and in design to adhere to simple dignity of proportion with but little ornamentation, and, above all, to make the building express its purpose.

UNION STATION, OMAHA, NEB.



UNION STATION, OMAHA, NEB.

UNION STATION, OMAHA, NEB.

A USE FOR BAD COLOR BRICKS.

WE are accustomed to see old houses, with otherwise plain brick walls, relieved at conspicuous places by brick patterns. A favorite pattern is the diamond, or a semi-circular arch in imitation of an opening. In fact, our forefathers disliked anything approaching a broad and absolutely plain surface. These designs in brick are very rarely seen in modern buildings, and one of the reasons for this, no doubt, is that brick walls generally have more openings than those of yore. But we saw something like a revival of this in a house wall the other day; only, the architect, instead of selecting bricks of definite tint to make the relief work conspicuous, preferred to make his designs in parti-colored bricks that had in fact been imperfectly fired. The result, even from an artistic standpoint, was not bad, and we shall doubtless see more of this species of decoration. This departure ought to suit brickmakers very well, for they would be enabled to dispose of bricks of bad color, though perfectly sound, at a fair price. Our brick walls are too plain, and we welcome this revival of an almost lost art."—*British Clayworker.*

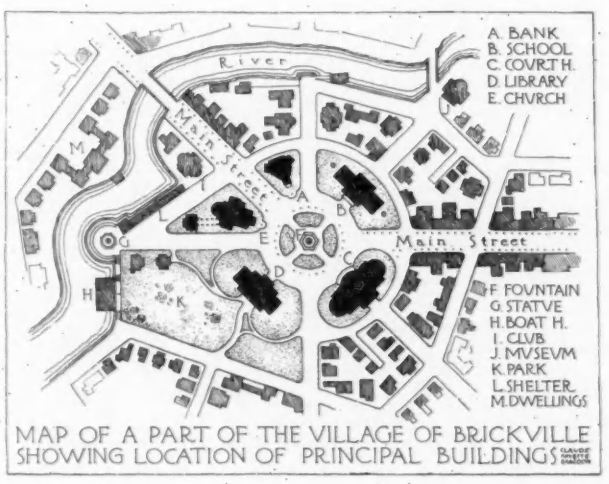
MAIN WAITING ROOM, UNION STATION, OMAHA, NEB.

The "Village Bank" Series.[1] I.

BY CLAUDE FAYETTE BRAGDON.

A letter from Michelangelo Jones, junior member of the architectural firm of Renn and Jones, to his partner, Vitruvius Renn, who is traveling in Italy.

". . . I am happy to inform you that our plans for the Citizens' Bank, of Brickville, have been accepted. I have just returned from that charming village and my first interview with the directors. You will remember my ancient interest in the place, dating from the time when, by the terms of old Ploughman's will, it became a co-operative, profit-sharing community. The business which he founded has increased enormously since his death, and Brickville is now, I am told, the larg st manufactory of horseless agricultural machinery in the world. The village lies in the midst of a vast and fertile plain, from which, on clear days, the mountains are visible, each peak flying a white flag of snow. The whole country is not unlike a newer, broader Lombardy, virgin and unhistoried. Strangely, or perhaps naturally, enough, Brickville reminds one of some Lombard city let loose from its confining girdle of walls. All the houses are built of an exquisite salmon-colored brick, native to the place, the streets are bowers of green, and the gardens



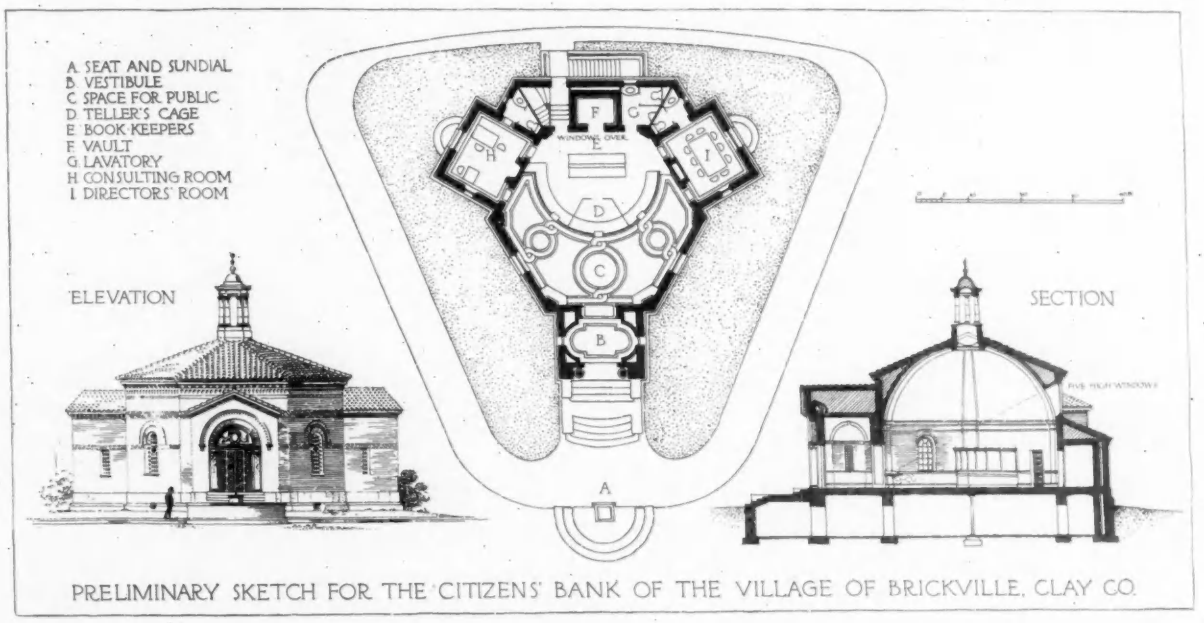
MAP OF A PART OF THE VILLAGE OF BRICKVILLE SHOWING LOCATION OF PRINCIPAL BUILDINGS

[1] PROGRAM.

The problem is to be treated primarily from a picturesque standpoint. The building is assumed to cost in the vicinity of twenty-five to thirty thousand dollars, and be only one story in height, the interior arranged for a main banking room, a small consulting room, a directors' room about 12 by 14 ft., a vault measuring outside of the brick walls 8 by 10 ft., and any other interior arrangements which may seem suitable. The main entrance is to be preceded by a small vestibule, and the building itself should be set back not less than 10 ft. from the street line and be isolated on all sides. The site is supposed to be a level one, and the bank will be in close proximity to the public library, the village church, the schoolhouse, and the court-house, which together will form the center of a town of a few thousand inhabitants. The design is to be of such nature as is suitable for being carried out in burnt-clay products.

and parks are gay with flowers; while overhead the sky is only less blue than the gorgeous ultramarine of an Italian summer.

"The village has been laid out with considerable skill and forethought, the principal buildings — that is to say, the court-house, library, school, and church — being grouped about a public square in the center of which stands a fine memorial fountain by Rodens. I was delighted to find that the bank site also fronts this square, being a little triangle at the intersection of three streets. I send you a tracing of part of the village map, which shows the whole thing clearly, together with a print of the sketch I submitted to the directors. The plan which seemed to fit the site best, and to fulfil the simple conditions of the problem, worked out in the most natural way into something so resembling some of the little brick buildings one sees in Tuscany and Lombardy that the style chose itself. I mean to pay great attention to what Mrs. Van Rensselaer calls 'structural finish' on the exterior. I propose using a twelve-inch brick laid up in Flemish bond with dark headers, and a broad gray joint, something like that used in the fine new Museum of Science and Art by Philadelphia's aggregated architects. What little detail there may be — in the cornice and entrance, principally — I'll study from early Italian models. That treatment of brick and terra-cotta it seems to me impossible to excel. Luckily, our library contains Strack's excellent work on the subject. If you go to Bologna, please make it a point to see if Emilia has any photographs that you think would help me."



PRELIMINARY SKETCH FOR THE CITIZENS' BANK OF THE VILLAGE OF BRICKVILLE, CLAY CO.

From Messrs. Jones and Renn to the Directors of the Citizens' Bank of Brickville.

"GENTLEMEN: The preliminary drawings which we submit herewith indicate with sufficient clearness the size, style, and arrangement of the bank building for which you have commissioned us to prepare plans. It is, therefore, only necessary here to touch upon such matters as are commonly embodied in an architect's specification, since they are not susceptible of a graphical presentation.

"MATERIALS: The building is to be constructed so far as possible of incombustible materials, your excellent local brick and terra-cotta for the exterior walls, Spanish tiles for the roof, steel for the floor beams, and for the interior finish American Verde antique marble, glazed tile or faience, and plaster.

"The counters, furniture, and other woodwork will be of mahogany, finished dark, and the screen which separates the public from the working part of the bank will be of bronze above a wainscoting of marble. The wicket openings in this screen are to be provided with plate-glass shelves, supported on bronze brackets.

"LIGHTING: The building is to be abundantly supplied with natural light in every part, the main banking room being lighted by five high windows opposite the entrance, two windows in the public space, and a skylight in the apex of the dome. This latter is to be glazed with stained and leaded glass, which may be illuminated by a cluster of electric lights above and behind it. Side brackets conveniently placed in all the rooms, a row of single lights along the top of the bronze screen, and desk lights, with swivel arms and green shades, will insure ample artificial illumination.

"HEATING AND VENTILATING: The building will be heated by means of hot water. All radiation will be indirect; that is, pure air heated to a proper temperature in the basement will be introduced into the various rooms through wall and floor registers.

"All rooms will be ventilated into flues connecting with the main ventilator at the highest part of the dome.

"PLUMBING: All plumbing appliances will be of the very latest and best pattern. The white earthenware fixtures will be set in and upon counter-sunk marble

slabs, all exposed piping will be nickel-plated, and all woodwork of mahogany, attached to the marble and earthenware with nickel-plated trimmings.

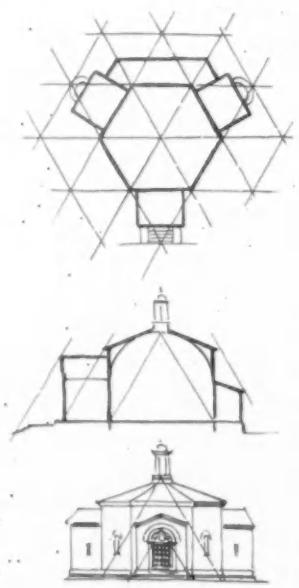
"DECORATING: The prevailing colors of the main banking room will be dark green and white, the color of the marble wainscoting; pale green and white, the color of the tile floor and of the faience above the wainscoting; bronze, the color of the screen; red brown, the color of the furniture; and pale yellow ochre, the color of the dome, though it is hoped that the appropriation for this part of the work may be sufficient to employ a mural painter of reputation to carry out some more ambitious scheme of decoration for the dome consistent with the nature and style of the building.

"COST: Two estimates of cost have been made, one by Messrs. Rough & Ready, contractors of Millamours, amounting to $23,800; and another by us, amounting to $25,951. It is our opinion that the expense, exclusive of decorating and furnishing, can without difficulty be confined to $25,000."

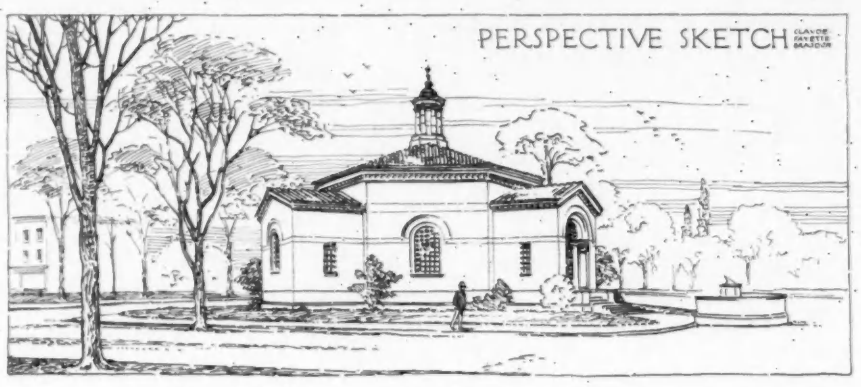
A letter from Mr. Jones to his friend, Vivette Redforth.

"MY DEAR VIVETTE: You alone of all my friends have seemed interested in what the others call my fantastic and mystical ideas concerning the art I practise. Perhaps this is because, occupied as you are in weaving romance into workaday lives, you are surprised to discover in me one to whom his daily task is itself as exciting and absorbing as a romance; but I fancy that with your wide sympathies and keen intelligence you are interested in the thing for its own sake, as I am.

"My practical-minded partner contends (with excellent reason) that the object of a work of architecture is to fulfil certain definite conditions in an economical and admirable way, and in fulfilling, to express these conditions. The truth of this contention I am surely the last to deny, but further than this I claim that the architect, who is also an artist, will, in working out his problem, instinctively and inevitably obey certain laws of beauty which reveal themselves to him as he progresses, with the result that his work becomes surcharged with a thousand mysterious meanings of which the beholder may be unconscious, but which excite, charm, and attract him like the thought of buried treasure. A work of architecture, it seems to me, becomes a work of art solely by reason of some such excess of beauty.



"However, I did not start to deliver a lecture, but to tell you about a little bank building I have been designing, which interests me hugely because it affords a better chance than usual to follow out some of my pet theories. I have just written a letter to Mr. Renn telling him all I thought he would like to know of the village, the site of the building, and the general arrangement and style I followed; another letter to the directors regarding the cost, the convenience, and a dozen other stupid and necessary things, and now to you I offer the kernel of the whole matter, the one thing that made it so worth while to me, — 'The cherry in the cocktail.' (You know the story; indeed, I think you told it to me.)



"The site happens to be a triangle, and as the building is to occupy nearly the whole of it, that must approximate a triangle too. The most perfect of all triangles is, of course, the equilateral. A building of exactly that shape might be very distressing; but it is conceivable that a building founded not too obviously upon the equilateral triangle, its every proportion being determined by it, might partake of some of the perfections of the generating figure. To have the triangle everywhere present, yet nowhere too apparent, like the flavor of onion in a salad, — that was the idea with which I set to work.

"Architecture, you know, is related to space in the same way that music is related to time, that is to say, one of its functions is to divide and subdivide space rhythmically and harmoniously. Failing in that, it is only a three dimensional noise. The plan, section, and elevation of my building, then, must all make music to the eye. So, like the equal and regular beats into which music is divided, I first marked off my paper into a number of equal equilateral triangles. '*As is the great, so is the small*' (says I to myself, says I), and if the whole building is to conform to an equilateral triangle, every part of it must do the same. It's like the vertebrate, which is nothing but a system of little spines; the tree which repeats itself in every leaf. On this pattern of triangles I traced the plan of my building, as you see it in the sketch. The interior proportions of the dome I established by means of a single equilateral triangle. (The dome of the Pantheon happens to be of this proportion too.) The same principle applied to the elevation yielded equally satisfactory results.

All this may seem to you too much like reducing art to a formula. It isn't as easy as it looks, and the last appeal is always to the eye, and not to geometry, just as in music the last appeal is to the ear. "I've told you only a part, but this letter is already too long. I hope I haven't bored you with all this; I had to talk it to somebody, and, as so often before, turned naturally to you."

Church Architecture in Materials of Clay.

ARCHITECTURAL readers and others in search of authentic data on this subject cannot do better than refer to THE BRICKBUILDER, vol. 5, pages 88, 89, and 90, in which St. John's R. C. Church, Johnstown, Pa,, is illustrated from scale details and photographs of the completed work. We have not yet seen the actual building, but judging from these illustrations and other particulars obtained from the architects, it would more than repay the cost of personal inspection. Such a bold and, we believe, successful venture could not fail to interest, in a special degree, those who contemplate a similar extensive use of clay products in conjunction with structural steel. That which a few years ago would have been decried as a far-fetched theory in church architecture has been submitted to, and has withstood, the test of professional criticism. Original ideas are not always workable, but here is one that must now be accepted as a palpable, permanent reality in advanced practice, opening up a vista of unexplored possibilities. In this, the concluding paper of a series, we have space for but one additional illustration. It, however, will serve to show the exact relationship existing between a really effective belfry and the main tower, which, with its sculptured frieze of life-size figures, remains the most commanding feature in the composition.

The building throughout is of brick and terra-cotta: the former a fire-flashed buff; the latter made to match as nearly as possible the prevailing tint. There is therefore nothing surprising in the statement that, after a test of four years, a building constructed of such materials remains proof against the effects of a smoke-laden atmosphere, even in a region so intimately associated with coal and iron.

FIG. 24. ST. JOHN'S CHURCH, JOHNSTOWN, PA.
Beezer Bros., Architects.

One other example selected from a great number must now suffice. For this we turn to the West End Presbyterian Church, 105th Street and Amsterdam Avenue, New York, designed by Mr. H. F. Kilburn. Here we have a good type of what may be described, in general terms, as a modernized Romanesque exterior, on which there is nothing to be seen save brick and terra-cotta from water-table to the cross on apex of tower. With the interior we are not particularly concerned at present, except to remark that the plan admits of an uninterrupted auditorium, suitable to a service in which the sermon has always been considered an essential feature. The style approaches Romanesque, perhaps, more closely than it does Renaissance, though the tall campanile and round arches are common to both. In detail, too, we find these styles about equally represented; also the classical fret and honeysuckle, the Norman zigzag, the spiral angles found in early French Renaissance, and the lozenged shafts of Venetian Gothic.

It will not, we hope, be supposed from this that the architect has resorted in any degree to what journalists are wont to call "paste and scissors" practice. This building is not in any sense a copy of something that exists elsewhere, nor has it been garbled piece-meal from contemporary work. With a copious architectural vocabulary, so to speak, from which all have been free to help themselves, he has formulated new thoughts, conveyed new ideas, and this, too, in a style of phraseology at once apt and idiomatic. All that has been, or ever can be, written in our language resolves itself into an alphabet of twenty-six letters. The letters in themselves are common property, but marshal them into words, sentences, paragraphs, etc., and we have a composition more or less original, appropriate, and expressive. The man who does this, and does it well, gives to his work a certain character and individuality, with which his name may become lastingly associated. Mr. Kilburn has not attempted to invent a new alphabet of architectural forms. He has contented himself with a selection of

FIG. 25. WEST END PRESBYTERIAN CHURCH, AMSTERDAM AVENUE AND 105TH STREET, NEW YORK CITY.
H. F. Kilburn, Architect.

such as best suited his purpose from among those "of different tongues and nations," all of which have done duty for ages. These he has transmuted through the medium of a trained intelligence, composing the units into members, the members into groups, and the whole into a well-ordered assemblage. Indeed, the several components are so placed that a latent affinity seems to spring up where, in less skilful hands, incongruity might have been expected. Whether viewed as a whole, or as to the relationship of its parts, there is hardly a discordant note in what is virtually an original composition.

This example is more ornate and a trifle less masculine than the one with which Mr. Waterhouse has furnished us; but while the plasticity of the material is accentuated in the free use of ornament, it cannot be said that anything has been overdone. That elaborate arched entrance and the fine triple windows have a setting of plain wall surface that preserves an equilibrium, imparting to the building an air of homogeneity and repose. Moreover, the richness and variety of these features are obtained at much less cost than might be supposed from a cursory view of the work when set, a circumstance that seems to call for some explanation. This is due chiefly to the fact that the design lends itself to an arrangement of jointing that produces the greatest possible repetition of shapes obtainable from a given number of molds. In other words, the number of shapes is small when compared with the number of blocks, — a safe test in fixing the relative cost of manufacture. The average size of the blocks is much less than could have been desired, but this drawback is offset to some extent by the greater convenience and immunity from risk in handling. This is true of the pilasters, capitals, voussoirs, etc., of which the several entrances are made up, and especially so of the modillion cornice immediately above. The two triple windows and the two rose windows in the gables, the coping on said gables and the four pinnacles at the intersections, resolve themselves into simple units, most of which can be repeated many times without appearing monotonous. The band-courses that alternate with brick have the same surface treatment throughout, chaste and unobtrusive in design, but none the less effective on that account. The dormers and corbelled balustrade below are alike on all sides of tower; while a single miter and one or two running pieces built up in successive courses constitute the pointed roof. The cross forming apex is the only block on the building that has not been duplicated, a distinction to which it is surely entitled.

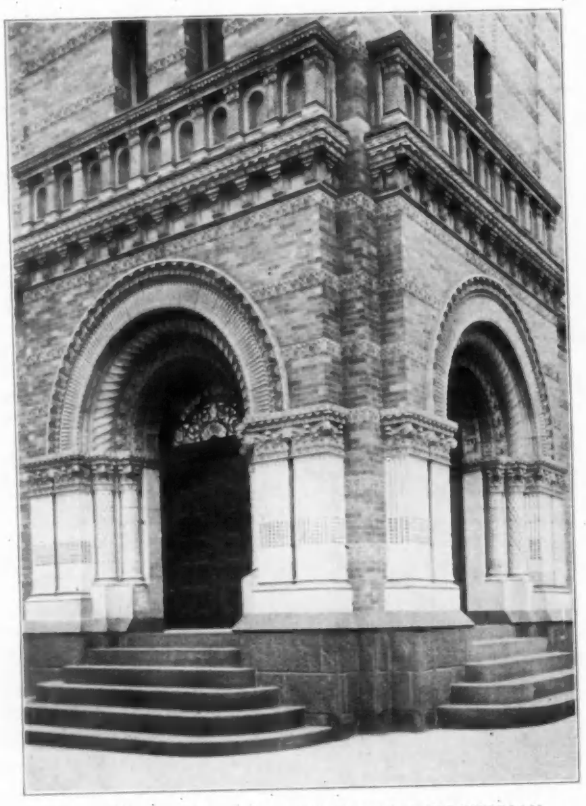


FIG. 26. ENTRANCE, WEST END PRESBYTERIAN CHURCH.

The first impression that one gets on approaching this church is a mellow harmony of color, in which a tawny buff predominates. The terra-cotta is of a slightly lighter tint, and no attempt has been made to imitate the subtle variations in the brick, which, as will be seen presently, is due to different conditions of manufacture. Neither tame nor obtrusive, the terra-cotta stands on its merits, not offering to decry, or with any desire to disown humbler members of the same family, but with just enough contrast to form a convenient and effective line of demarcation. The last and most enduring impression produced by an examination of this building is: The degree of elaboration and seeming variety of detail that can be obtained by a surprisingly small number of individual units. Herein lies the great secret for which architects invariably seek, and often fail to find a key: How to reconcile the artistic and commercial exigencies that arise in using so many cubic feet of terra-cotta.

The growing popularity of speckled brick, in shades varying from yellow buff to dark brown, is seen in the extent to which they have been used in recent church building. A demand has now arisen for speckled terra-cotta that will match such shade of brick as may happen to be selected. Some architects take it for granted that anything procurable in brick can be duplicated in blocks of a larger size, seeing that both are of burnt clay. This assumption is far too sweeping, for though to some extent true, it is subject to important limitations. To meet this demand, some manufacturers have gone the length of using the same clay mixture, and burning both classes of goods in the same kind of kiln, hoping thereby to insure with greater certainty the results sought after. Theoretically this line of procedure would appear eminently feasible, but the practical difficulties encountered are not always easily overcome.

In the first place, a piece of clay forced into shape under pressure in a steel mold will not be a perfect match for another piece pressed in a plaster mold and finished by hand. The surface texture, after burning, will differ in each case, and so also will the color. This, however, as compared with other drawbacks to which we are about to refer, is really a minor consideration. In attempting to burn terra-cotta under the same conditions as invariably prevail in the production of Pompeiian brick all expectation of uniformity in color must be abandoned.

In an open fire, as distinguished from a muffled kiln, tongues of flame impinge in a haphazard way on the goods. In clay that contains varying percentages of iron, this intense heat produces corresponding degrees of oxidation. The surface likewise becomes disturbed by a pimply excrescence, or it may be slightly pitted by the exudation of iron that has melted and disappeared. Similar manifestations will appear in blocks of terra-cotta, but in such irregular and erratic fashion as to destroy all hope of reasonable uniformity.

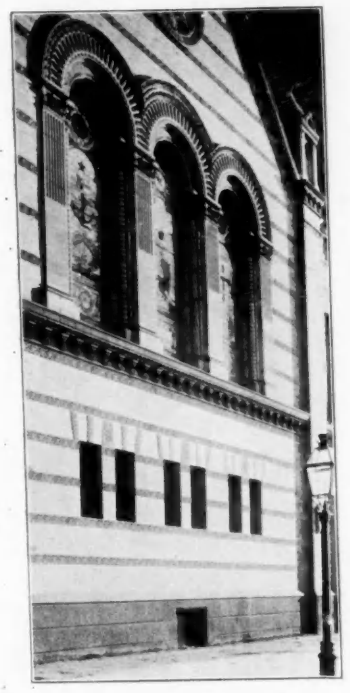


FIG. 27. TRIPLE WINDOWS, WEST END PRESBYTERIAN CHURCH.

There are many supplementary agencies, more or less capricious in their action, that are difficult, if not impossible, to control. Among these we have the quality as well as the degree of heat, the character of the gases that generate in the kiln, depending on the amount of air allowed to enter during the several stages of burning, also during the process of cooling. Some of these are fairly well understood, therefore under control; some are matters of conjecture on which authorities differ; while some are, as yet, beyond the ken of acknowledged experts. On one thing they do agree, however, and that is, the glorious uncertainty of burning terra-cotta in an open fire. Of course, in the case of brick, this necessity has of late been accepted as a positive virtue; for it is the variation so caused that has created the demand, and given them such widespread popularity. Not so with relatively large blocks of terra-cotta, the several positions of which have been pre-determined, and which cannot be classified at will, or shifted into new combinations. When set in position, the light and dark blocks alternating in such way as to render the difference still more conspicuous, we get an unpleasant reminder of terra-cotta making as it existed among us some ten or fifteen years ago. The fact is, that this variation of color, which gives added charm to the small units, becomes an eyesore in terra-cotta, wherein the blocks are necessarily large and rarely interchangeable.

The same objections that have been urged against open firing on the score of color hold good in the equally important matter of fit and accuracy of dimension. The surfaces cannot be held true, the members will not take up with each other at the joints, and the shrinkage scale amounts to a mere approximation on which no positive reliance can be placed. Something, no doubt, depends on the point of view from which these shortcomings are seen by architects. One man will insist on perfectly even color, close joints, good lines, and much mechanical exactitude; another will aim at an antique, rugged picturesqueness. In the latter case some of the defects just enumerated would instantly disappear, while others would take on a new attractiveness. We have seen work of the kind referred to used on factory and storage buildings with excellent effect. On recently erected power-houses, etc., it gives an impression of strength, durability, and titanic force in admirable keeping with the character of such buildings. These, however, are exceptions to the general rule, and must be judged by a far different standard from that which prevails in the class of work which we have had under consideration.

When an architect calls for terra-cotta to match his brick, — a not unusual nor yet unreasonable requirement, — the manufacturers are still at liberty, we presume, to adopt the best-known method by which the desired result may be attained. We are not betraying any trade secret in saying that there *are* ways in which any shade of Pompeiian brick can be duplicated in terra-cotta, and still preserve a degree of uniformity equal to that of stone. It *has* been done frequently of late in the regular course of business, with complete success; and we all know that what man has done man can do, if he exerts himself. Architects do not concern themselves so much with the process as they do with the product. We have not heard of a case in which any one method of manufacture was specified, all others being prohibited. For example, in order to reduce the particles of crude iron contained in the clay from which this variety of brick is made, a flame of great intensity must come directly into contact with each brick. In a muffled kiln, such as is used for burning perhaps 90 per cent. of all the terra-cotta made, no direct flame is permitted to enter; hence, these particles of iron remain inert, their presence having no appreciable effect on the goods. At this point, however, practical science steps in to assist nature, by a further legitimate use of her own bountiful resources. By adding to the clay varying percentages of granulated manganese that will fuse at a relatively low temperature, we get corresponding shades of Pompeiian terra-cotta, each of them pre-determined and under control. Work so produced will possess a degree of uniformity in color, trueness of line, and mechanical fitness that would be quite impossible of attainment by a haphazard system of burning, under which the all-important human factor is, for the time being, entirely eliminated.

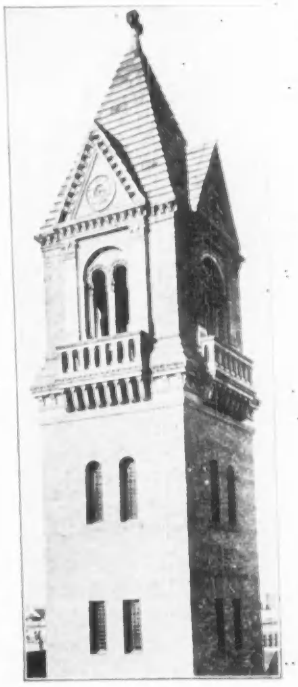


FIG. 28. SPIRE, WEST END PRESBYTERIAN CHURCH.

Fire-proofing.

PRACTICAL FIRE TESTS.

Fire Curtains. — The only tests with fire curtains which the committee have as yet carried out have been with those made by Mr. Rasmus Bugge. In one instance the curtain was 8 ft. 6 ins. wide and 8 ft. high, and consisted of a woolen material on which three horizontal rows of pockets (made of hard-woven cloth) were arranged. The object of these pockets was to catch any water that might be thrown on the curtain from a hose, or whatever water trickled down from the perforated rubber hose pipe extending along the top. The temperature of the fire commenced at 300 degs. Fahr. and increased to 1,500 degs. Fahr. After a test of half an hour the curtain remained in position, though a few small holes had been burnt in it at the top. The question of protecting door and window openings by the use of fire-resisting blinds and screens is an important one, particularly in connection with buildings in narrow thoroughfares; the great Cripplegate fire was an instance where the judicious application of these means would have checked considerably the spread of the flames.

Glazing. — About half a dozen tests with glazing have been made by the British Fire Prevention Committee, though only one of them was a private test. On two occasions casements glazed by the British Luxfer Prism Syndicate, Ltd., of London, have been tested, the duration of the fire being thirty minutes in one case and forty-five minutes in the other. The casements consisted of electro-glazed squares of plate glass ¾ in. thick (4-in. square), framed with a brass border and fixed in rebated teak frames by teak beads; each casement showed glazing measuring 3 by 4 ft., and had 108 squares.

The following summaries show the effect of the fire: — In the first test (that lasting half an hour), the squares remained in position, but seven out of the 324 (there were three casements) were broken, and pieces fell out of them. After twelve minutes the whole area of the glazing commenced to bulge inwards, and in twenty-one minutes the top part of the center casement sagged and left a space between the glazing and the teak frame, which was charred to a depth of about ½ in. on the inside. No glazing bars were broken or appreciably oxidized. The second test (that lasting three quarters of an hour) was less satisfactory, for after considerable bulging inwards and outwards the glass in two of the casements fell in (after about thirty-five minutes), though the third casement remained in position. Five skylights glazed by the British Luxfer Prism Syndicate, Ltd., each showing 1 ft. 8 ins. by 3 ft. of glazing, and having 45 glass prisms 4 ins. square, were tested, but four of them fell in within half an hour, the highest temperature recorded being 1,225 degs. Fahr. Two tests have been made with casements and skylights glazed with wired glass by Messrs. Pilkington Brothers, Ltd., of St. Helens and London. Each of the casements showed 2 ft. 9⅞ ins. by 3 ft. 11½ ins. of glazing (¼ in. thick) in the clear, and though the glass was very much buckled and fused, it was unbroken at the end of forty-nine minutes; the highest temperature recorded was 1,760 degs. Fahr. The test with the skylights lasted half an hour, and at the end of that time the glass was intact and had not let fire through; the highest temperature was about 1,500 degs. Fahr.

A most interesting test undertaken by the committee was with three casements; one glazed with ¼-in. plate glass, one with 32-oz. sheet glass, and one with "lead lights." The following is a summary of the effect: Within six minutes flame burst through the 32-oz. glass and half the sheet had fallen, the other half falling within twelve and one half minutes. After seven minutes the lead glazing collapsed, and after twelve minutes the fire came through the ¼-in. plate casement, the whole sheet falling within fourteen minutes. It is important to note that all three casements fell in less than a quarter of an hour, and no water was applied. The protection of the ordinary window and skylight openings has been all too long neglected, and the results mentioned above should therefore be of special value.

Partitions. — One of the early tests made by the committee was with a lath and plaster partition and a brick nogged partition. One portion of the former was made with wood lathing and the other portion with plain wire lathing; while the brick-nogged partition showed two kinds of construction, — brick laid flat, and brick on edge. Three weeks and a half (spring) were allowed for construction. At the end of the test (which lasted an hour) the lath and plaster partition was practically destroyed, the fire breaking through the plastering on wood lath in twenty-eight minutes, at about 1,600 degs. Fahr., and through that on wire lath in forty minutes, at about 1,750 degs. Fahr. The brick-nogged partition resisted the fire for the hour, although the plastering was disintegrated and the studs charred. The comparatively long resistance of these partitions was no doubt due to the fact that the plastering went from floor to ceiling, not stopping short behind a skirting as is often done in ordinary work; it frequently happens that the fire first breaks through at the skirting.

In November last a test was made with a partition erected by the "Gypsine" Brick Company, Ltd., of London and Paris. It was 7 ft. 9 ins. by 10 ft., and the bricks of which it was constructed were 13⅜ ins. long, 7¾ ins. deep, and 3¼ ins. thick. They were made of "a mixture, by means of water, of plaster, hydraulic lime, some sort of neutral material, such as coke, sand, etc., and a fire-proof material, such as asbestos, with an addition of sulphuric acid." The joints on the fire side were raked out for ⅜ ins. and filled in with fire-clay, the whole surface of the partition being afterwards covered with a thin coating of the same material. The test lasted one hour. A portion of the fire-clay coating fell when heat was applied, and a further portion (and nearly all the pointing) on the application of water. The bricks were sodden with water, but in no place did the fire pass through the partition, which, on the outer surface, was never hot enough to ignite a match. The partition erected by the Mural and Decorations Syndicate, Ltd., of London, consisted of wire lathing stretched between rods and having pieces of terra-cotta burnt on at the

junctions; three coats of plaster were given to each side. The highest temperature reached was 2,130 degs. Fahr. On the application of water to the fire side of the partition a considerable portion of the setting coat was washed off. The outside temperature was too hot to bear the hand, though not sufficient to light a vesta by contact. The fire did not pass through the partition. The test lasted an hour and a quarter.

A match-boarded partition filled in with slag-wool, erected by Messrs. D. Anderson & Son, Ltd., and Messrs. J. C. Broadbent & Co., Ltd., both of London, was tested for three quarters of an hour with the following result: "The internal boarding (¾ ins.) was completely destroyed, and the slag-wool was fused and blackened on the inside face, but the fire did not pass through it. The outside boarding was sound and clean. The maximum temperature was 1,840 degs. Fahr. In this case the slag-wool was carefully packed; on a previous occasion it was not, and the fire broke through.

Protective Coverings. — The committee have as yet only had one test with protective coverings, that with girder coverings made by the "Gypsine" Brick Company, Ltd., of London and Paris. Two steel joists, each 7 by 2¼ ins., were placed across the hut; one was covered with the protective material till it was 15¼ by 9 ins., and the other till it was 12¼ by 4¾ ins. Two weeks were allowed for construction and drying. The fire lasted one hour, and the highest temperature recorded was 1,740 degs. Fahr. The following observations were made at the end of the test: — The composition around the larger beam remained attached all round (though it was very sodden from the water applied), and the girder was not affected. A layer of material ⅝ ins. thick had dropped off the beam of smaller section, the sides showed vertical cracks, and the material was sodden and easily impressed.

Treated Wood. — The test with certain boards treated by the British Non-flammable Wood Company, Ltd., of London, should, perhaps, come under the heading of "partitions," but they were only arranged in this form for the sake of convenience. The impregnated boards were of yellow pine, and were 1 in. thick. There were three stages in the test: first, the application of flame for five minutes from one side at a temperature of 1,000 degs. Fahr.; then at the same spot for ten minutes at a temperature of 1,150 degs. Fahr.; and, lastly, at a second spot for fifteen minutes at a temperature of about 1,300 degs. Fahr. The effect was as follows: No incandescence or spread of flame was observed, nor did the material, so far as could be seen, contribute in any way to the spread of flame. The surface of the boards was charred.

It will be seen from the particulars given in this article, and the one preceding it, that the British Fire Prevention Committee (of which Mr. Edwin O. Sachs is the founder and chairman) are doing a most useful work in conducting these independent tests. While disastrous fires are so frequent, the science of fire-proof construction must be pursued and perfected till it is thoroughly effective, and all those who contribute towards this end must certainly deserve the unstinted praise of their fellow-men.

Inferior Cement in the American Market.

NOTWITHSTANDING the high character of the best American and German cement which is available in our markets to-day, there is a large amount of second and third grade material sold which is more or less inferior in quality.

English Portland cement was, up to ten or fifteen years ago, our chief source of supply. In 1880 nearly three times as much was imported from Great Britain as from the Continent, but it was largely superseded by the German cements when the superior quality of the latter became understood. English cements were for many years underburned and low in lime. They were quick setting and of no great strength, and large quantities were sold in the United States without the name of any reputable firm on the packages. Under the spur of competition the quality has now been considerably improved, so that several brands are to be had to-day which ordinarily compare very well with the German product, although they would not even now, probably, be selected for surface work such as sidewalks. The great mass of cheap and inferior English cements are becoming less common, but their places have been taken by the Belgium and American cements of the same class, with which the market is flooded.

In Belgium cements of several kinds are made. A rock is found there in abundance which has nearly the proportions necessary for a good Portland cement. According to a report of the United States Consul, one of the rocks in use has the following composition: —

Silica	15.75
Alumina	3.95
Iron oxide	1.00
Lime	43.10
Magnesia	.49
Sulphuric acid	.50
Carbonic acid and water	35.21

This is largely burned in its natural condition to sintering, and a so-called natural Portland cement made from it without further manipulation. Of course, it is very seldom that this is of normal composition and properties, but owing to the economy possible in its manufacture it can be put on the market at a very low price. It has a corresponding value, and has been largely sold in certain parts of America under brands having the names of various animals, birds, etc. A test of one of these cements from the New Orleans market resulted as follows: —

	Neat Mortar.		Sand Mortar 1 to 3.	
	Tensile.	Crushing.	Tensile.	Crushing.
7 days	326	1635	58	482
28 "	466	2700	120	798

This is plainly a very inferior cement.

In this country there are found several inferior forms of cement sold as Portland, which are not of normal composition and character. Among these is a cement which was intended for a high-grade material, but which from lack of care in burning or departure from a normal composition must be sold as second grade. Such a cement now on the New York market analyzes and tests as follows: —

ANALYSIS.

	Per cent.
Ignition	3.66
Silica	21.90
Alumina	9.08
Iron oxide	2.92
Lime	56.00
Magnesia	3.02
Sulphuric acid	1.62
Alkalies	Undetermined

Then there is the "improved" cement made by the addition of the preceding material in certain proportions to natural rock cement, tests of which were given in connection with those of natural cement, and the ground, overburned and partially sintered rock, which is a by-product in the burning of natural cements. Tests and analysis of this material, product, or third-grade Portland cement are as follows: —

Silica, uncombined		6.36
Silica, combined,	SiO_2	19.50
Alumina oxide	Al_2O_3	7.74
Iron oxide	Fe_2O_3	3.06
Lime oxide	CaO	52.10
Magnesia oxide	MgO	3.05
Sulphur	SO_3	1.48
Potassium oxide	K_2O	.98
Soda oxide	Na_2O	1.16
Ignition	$Aq+CO_2$	5.30

SILICA PORTLAND CEMENT.

Besides these cements there is another class, consisting of good Portland ground together with about half its weight of sand or limestone to an impalpable powder, which, if sold on its merits, and at a proper price, is, no doubt, of great value and importance, as experiments have shown the Portland cement used in this way can be made to go very much further than in any other, without corresponding loss of strength. The results obtained with such a cement were as follows: —

Cement and sand, 50 per cent. of each, ground together: —

	Sand Mortar — 1 to 3 Tensile.	Crushing.
7 days	152, 160, 154	1556
	Portland cement — Normal.	
7 days	160, 156, 158	1700

The cause of this apparently impossible result is that the two materials are ground to an impalpable powder, and most thoroughly mixed. In this condition the finely ground silica serves to fill the voids in the sand and to join with the cement in making a mortar which will fully cover and enclose the sand particles. The smaller amount of actual cement is, therefore, able to do the work, in conjunction with the powdered silica, that a volume of pure cement equal to that of the mixture would do.

It is important, and in fact necessary, however, that the cement and sand should be ground together so intimately that they are thoroughly mixed and extraordinarily fine. As soon as this condition fails to be realized, there is an immediate failure in the results.

For the successful accomplishment of the grinding and mixing, the tube mill seems to be the best suited. While in practice not more than equal volumes of sand and cement have been ordinarily used, most remarkable results have been obtained when one part of cement was ground with six parts of beach sand. Tests of this material with two parts of sand at seven days gave from 60 to 80 lbs. tensile strength.

SLAG CEMENT.

There is another form of hydraulic cement which has only of late made its appearance in the American markets, although it has been known commercially on the Continent since 1882–83. This is called properly slag cement, as it is made by grinding slag together with slaked lime. Blast furnace slag is used for the purpose, and it is, unfortunately, a very variable material in composition, according to the ore in use, the amount and kind of flux, and the temperature. It consists mainly of silicates of lime and alumina, but it may be basic, neutral, or acid in composition. Physically, it may vary very much, some forms being permanent when exposed to the weather, and used for ballast or for bricks, other forms falling to pieces on exposure.

The basic form alone is suitable for cement making, and this only when it has been granulated by running it into water while in a very fluid and thin condition. What the effect of granulation is is not entirely understood, but it is evident that in sudden cooling there is a different arrangement of the constituents from that which takes place on slow cooling. The method of granulation is important. It should be done while the slag is hot and very liquid, and plenty of water used. In the operation sulphur is partly removed. The product is a more or less sharp, pumice-like, partly transparent material, and the result of the operation is that in the granulated form the silica is in a condition to combine with lime in the presence of water, gelatinizing readily with acids.

Greenish-gray slags from gray cast iron are much better than the yellow foaming kind, but in any event the ratio of lime to silica, $CaOSiO_2$, must not sink as low as 1, for slags of this description are useless. It ordinarily runs from 1.72 to .64, so that many kinds are of no value. The more basic they are the better.

With the same operating methods uniform slags may be produced at any one furnace, but at different points the greatest variety is found.

Slags for cements must, of course, be free from magnesia and not contain much sulphur, but some of the latter is lost in the act of granulation. Fresh slags are more actively hydraulic. Although on storage they lose some sulphur, they have not the same lime capacity, but are, nevertheless, more reliable. The grinding of the granulated slag, like all operations of this sort in cement making, must be very thorough. According to Tetmajer, it must be so fine that not more than 8 per cent. shall remain on a sieve of one hundred and seventy-eight meshes to the lineal inch.

The lime used in slag cement is well-burned caustic lime free from magnesia, which has been thoroughly slaked, or in some instances hydraulic lime, which has been found to have no injurious effect on the strength and a favorable one on the soundness of the product. The caustic lime slaked by either the method of packing it in baskets which are immersed in water and the saturated lime piled in heaps for some time, or it is spread in layers 4 to 8 ins. deep and sprinkled with water until slaked, when it is heaped up under cover and left fourteen days. Then the slaked lime obtained in either way is screened from the coarser particles, and finally the finest meal obtained by air-blast separators or bolting.

Machines have also been designed for carrying out the operation of slaking rapidly, and at times attempts have been made to slake the lime with the water adherent to the granulated slag.

The fine powder is usually stored for some time to completely slake it, as much more favorable results are obtained with such material. It should then be soft dust and free from any hard particles which might eventually become hydrated in the cement and cause expansion and checking.

The ground slag and lime are best mixed by a second grinding together in the proper proportion, which has the double object of reducing the product to an even more minute state of subdivision, and bringing about a thorough mixture, and thus preventing any tendency to checking and expansion.

The best Swiss slag cement from Chonidez, prepared in the way that has been described, has, according to Tetmajer, the following properties: —

Specific gravity	2.63 — 2.75
Volume weight, loose	62.3 lbs. per cu. ft.
,, ,, packed	101.0 ,, ,, ,, ,,

Strength of Mortar, 1 : 3; German Normal Sand in water,

Water for Mortar, 10.5 per cent.

	Tensile.	Crushing.
7 days	144 — 252	1276 — 1847
28 ,,	305 — 417	3195 — 3870
84 ,,	451 — 550	4630 — 5344
1 year	562 — 660	4929 — 5766
2 years	569 — 631	5376 — 5948

Strength of Mortar, 1 : 3, Building Sand.

	Water.	Air.
7 days	203	227
28 ,,	452	296
84 ,,	489	313
210 ,,	568	356
1 year	519	433

The proportion of lime added to the slag will vary from 25 to 100 per cent., according to the capacity of the slag for bases. Tetmajer considers that these and other tests, as well as the results of its practical application, show that this slag cement is particularly suited to work under most varying conditions in water, in damp places, but less so in air; and that while it should be allowed to set before being acted upon by water, it is less affected by it than other hydraulic cements. Its great disadvantage, on the other hand, he shows to be its tendency to form, in air, surface cracks, the more so the higher the lime, these being due as much to drying out of the mortar and consequent contraction as to deficiency in composition. He also finds that as the hardening of slag cements is due to the hydrating of the silica of the silicates by water, the presence of an abundance of this is necessary at all stages of the process, and that if the cement is allowed to dry out this will come to an end. The slag cements, therefore, do particularly well in moist localities.

Not all slag cements are as satisfactory as that which has been described. Where the slag comes from a furnace, the proprietor of which has no interest in making a suitable or uniform product for cement making, the resulting cement is very variable and inferior, and may give the best material of its kind a bad name. Most of this material has been put upon the market in Germany.

Selected Miscellany.

NOTES FROM NEW YORK.

The general state of affairs in the building world is good, although there is a dearth of large transactions, which is perhaps natural at this time of year.

On October 7, the cornerstone of St. Peter's R. C. Church, Staten Island, was laid. From the published

VIEW OF GENERAL WAITING ROOM, UNION STATION, DAYTON, OHIO.
Elzner & Anderson, Architects.

drawings this promises to be a very handsome structure. It is in the Romanesque style, and will be built of brick with terra-cotta trimmings, — another tribute to the fast-growing popularity of these materials for buildings of beauty as well as utility. The architects are George Edward Harding and Gooch of New York City.

My attention has been called recently to an old game which contractors from times remote have worked, and for which young architects should be on their guard. The contractor will write asking if, as a favor, you will kindly allow him to use a brand of roofing tin of which he has a stock on hand instead of the one specified. He

CAP, PEABODY & STEARNS, ARCHITECTS.
Atlantic Terra-Cotta Company, makers.

assures you that it is just as good, costs just as much, and will save considerable time if he can use it. Twice within a year I have investigated and found that the article mentioned was worth in one case only half as much as the article specified, and in another case only one fifth, although we regret exceedingly to impute any dishonest thought or action to such proverbially honest and upright men as contractors.

It is hardly necessary to remark upon the practice of the acceptance by architects of commissions from contractors or manufacturers. Certainly, no architect can be innocent of the fact that it is not only reprehensible, but absolutely dishonest. There is, however, a tendency to overcome this and ease the conscience by accepting gifts of more or less value, which is not only just as bad, but the architect himself is the worst sufferer, as he thus allows a mortgage to be placed on his professional life with foreclosure as a sure result. I have in mind the case of a friend who upon his birthday was presented by a firm of woodworkers with a beautiful leather-covered easy-chair. It was done in a gentlemanly way and as a token for past favors. The architect, although it must have cost him a pang, had it sent back in just as gentlemanly a way, felt better for it afterwards, and no offense was taken on either side.

ST. JOHN'S HOSPITAL, ST. LOUIS, MO.
Barnett, Haynes & Barnett, Architects.

NOTES FROM CHICAGO.

A number of leading hotel and restaurant proprietors are planning the erection of a model cooperative laundry plant to cost in the neighborhood of $100,000, in order to do away with the expense and inconvenience of doing laundry work on their own premises. Should it prove a success, the same people talk of establishing a cooperative warehouse.

Mr. Dwight Heald Perkins has been appointed architect of Hitchcock Hall, a new dormitory building to be erected for the University of Chicago, and has been sent abroad to study the collegiate buildings of England, particularly those of Oxford. He will return about the first of November.

The annual meeting of the Chicago Architectural Club was held at the Art Institute, Monday, October 1, at which the following officers were elected: President, Henry K. Holsman; vice-president, Robert C. Spencer, Jr.; secretary, Birch Burdette Long; treasurer, Adolph Bernhard.

Pond & Pond are designing the new Northwestern University settlement building.

Shepley, Rutan & Cool-

DESIGN FOR WILDER HALL, WELLESLEY COLLEGE, WELLESLEY, MASS.
J. A. Schweinfurth, Architect.

idge are at work on the plans for several new buildings for the University of Chicago, including the new gymnasium.

Marshall Field & Co. have taken out a permit for a new steel and brick retail store building, twelve stories

"SUNNYSIDE," SHOWING ALTERATIONS AND ADDITIONS, FROM THE NORTH.
William H. Mersereau, Architect for alterations.

in height, to cover the site of their present retail stores, 83–99 State Street. The firm secured a permit last spring for a building of the same height to cover the remaining portion of the block which is now occupied by Central Music Hall and the two stores south of it. They are ready to cover the entire block with a

"SUNNYSIDE," BEFORE ADDITIONS WERE MADE.

building two stories higher than the present building ordinances permit. It is said, however, that only the Music Hall end will be built at first, probably beginning next spring if present labor difficulties are disposed of before that time. The plans have been prepared by D. H. Burnham & Co., and involve a total outlay of about $3,000,000.

NOTES FROM PITTSBURGH.

The United States War Department has approved the plans of the Pennsylvania Company for the rebuilding of their bridge across the Allegheny River; the plans call for a bridge of the same height as the present one, and this disposes of the question whether the other bridges would be raised.

A large hotel and apartment house is to be built on

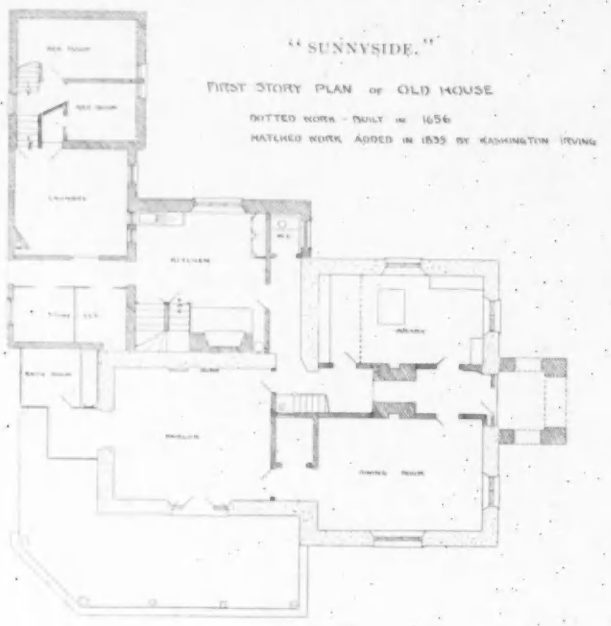
"SUNNYSIDE," AFTER ADDITIONS WERE MADE.

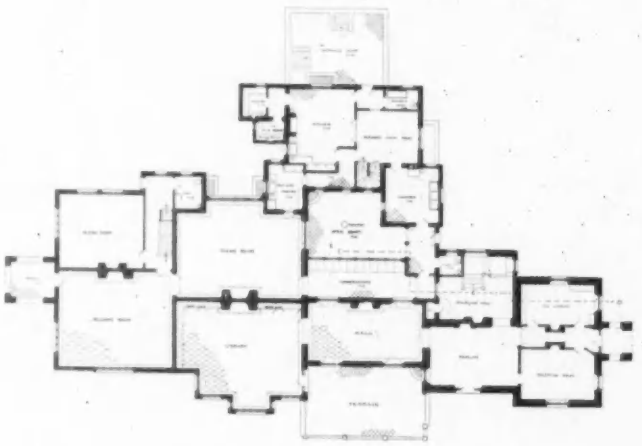
North Avenue, Allegheny, to cost $500,000. The papers announce that the owner has prepared his own plans.

A library building is to be built at Beaver, Pa. It is presented to the town by Mr. Carnegie.

This recalls the fact that, in several instances, similar

offers of Mr. Carnegie have resulted in such bitter disputes between factions that he has been obliged to withdraw





PLAN, FIRST FLOOR, "SUNNYSIDE," SHOWING ALTERATIONS AND ADDITIONS.

the offer; lately, in one town, an old burying-ground was obtained by the trustees as a library lot. After they had carefully removed all the bodies, the dispute broke out again, the offer was withdrawn, and now the town is trying to make the trustees pay for the work already done, amounting to over $2,000 for each trustee.

APARTMENTS, 94TH STREET AND CENTRAL PARK WEST, NEW YORK CITY.
James E. Ware & Sons and H. S. S. Harde, Associate Architects.
Fire-proofed by the National Fire-proofing Company.

CAP, CHARLES I. BERG, ARCHITECT.
Perth Amboy Terra-Cotta Company, makers.

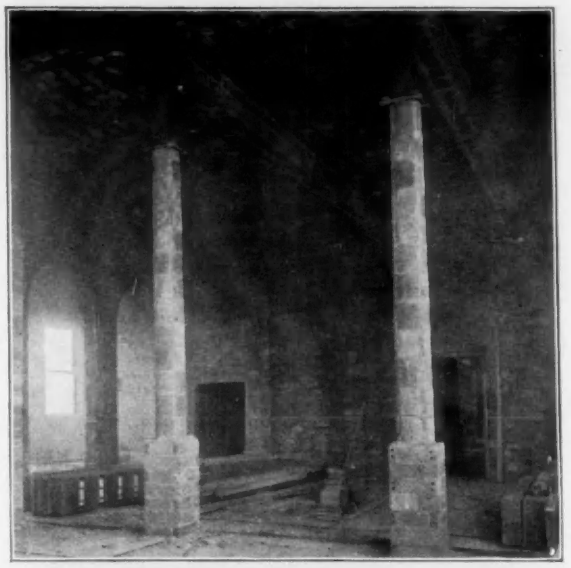
Peabody & Stearns, of Boston, have let the contract for a new residence on Forks Street, to cost $70,000.

RESIDENCES AT ST. LOUIS, MO.
Deitering & Klipstein, Architects.

NOTES FROM ST. LOUIS.

It is hard to find a good excuse for the continued dullness in the building line, with so much activity in other directions, unless it is the uncertainty existing as to whether the World's Fair will be held here. This question is to be determined by the voters at the coming election through the adoption or rejection of amendments to the city charter permitting the issuing of $5,000,000 of bonds in aid of the Exposition, Congress having appropriated a similar amount conditional upon the city expending $10,000,000, the half of which it is expected to raise by subscription.

Mr. T. S. McPheters has completed a cold



TERRA-COTTA FIRE-PROOF CONSTRUCTION, FREE PUBLIC LIBRARY, NEWARK, N. J.
Fire-proofing supplied by the Raritan Hollow and Porous Brick Company.
Rankin & Kellogg, Architects.

storage plant, fronting upon both sides of Lewis Street, near O'Fallon Street, with a capacity of one million cubic feet. The building is six stories with a basement, and is connected with about two miles of main distributing pipe, through which it is intended to supply refrigeration to the commission houses. The ice plant has a capacity of 120 tons per day.

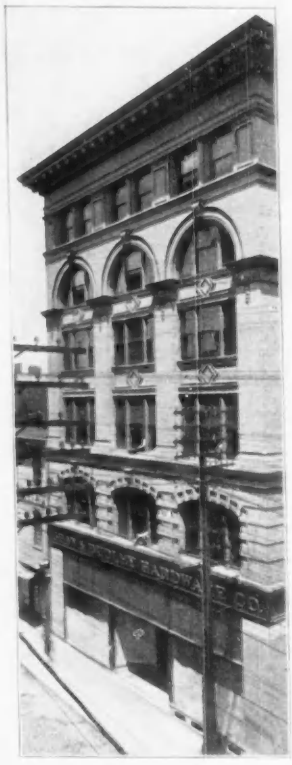
Architect Isaac Taylor spent his vacation in Europe, visiting the Paris Exposition before returning.

Mr. T. B. Annan has been appointed chief draughtsman and Arthur Ellicott assistant on the new City Hospital by building commissioner Charles F. Longfellow, the ordinance providing for the erection of the building requiring that the commissioner make the plans and superintend the construction.

The competition for the new building for the Bank of Commerce resulted in the selection of Mr. Taylor's design; those submitting drawings being Messrs. Eames & Young, Isaac Taylor, W. A. Swasey, T. C. Link, and Albert Knell.

NOTES FROM DETROIT.

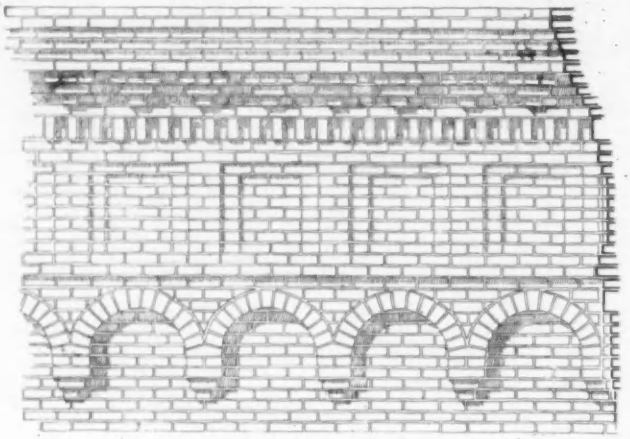
Four years ago building operations in Detroit were at the lowest ebb. This year and this month they are probably pretty near their zenith. Buildings are going up everywhere, and though operations are especially active in residence work, there are quite a few "holes in the ground" from which store, office, and factory buildings are rising. A few interesting buildings are nearing completion: The Eastern High School, which when completed will cost $175,000, of which Malcomson & Higginbotham are architects; the office building for Berry brothers, cost $35,000, and a residence for Mr. Wm. M. Finck by architect George D. Mason. All of these buildings are of brick, stone, and terra-cotta, and among the best things, architecturally, in the city.



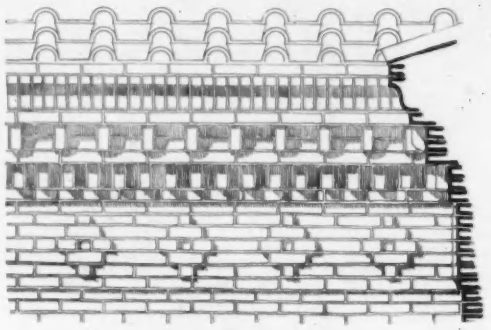
THE GRAY-DUDLEY BUILDING, NASHVILLE, TENN.
Built of gray standard brick, made by the Columbus Brick and Terra-Cotta Company.

There have been, and are being, held some interesting competitions for important work. The plans for the Aquarium and Horticultural Building, on Belle Isle, to cost $100,000, are about to be placed in the hands of an

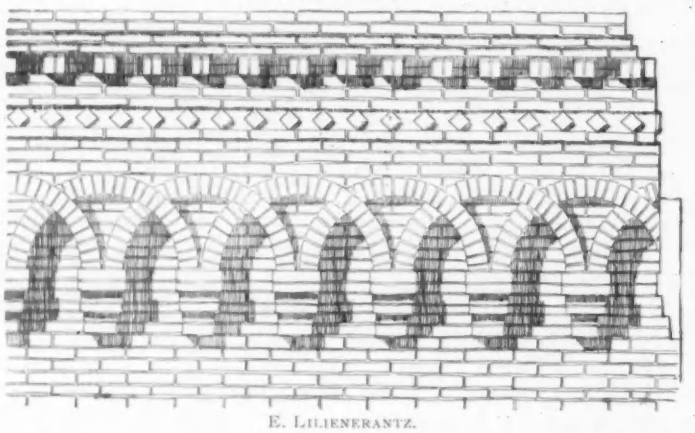
SEMI-DETACHED HOUSES, LOUISVILLE, KY.
Brick supplied by the Ohio Mining and Manufacturing Company.
Mason Maury, Architect.



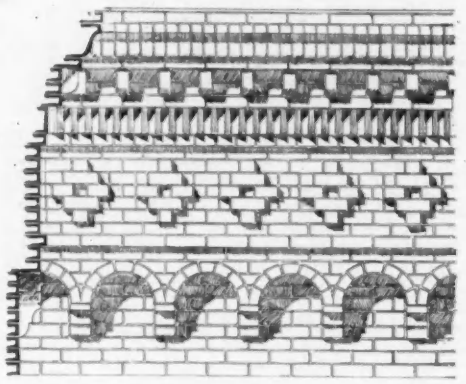
F. N. Emerson.



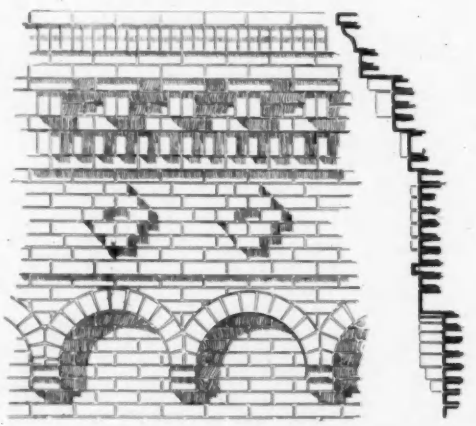
James Lovell Little, Jr.



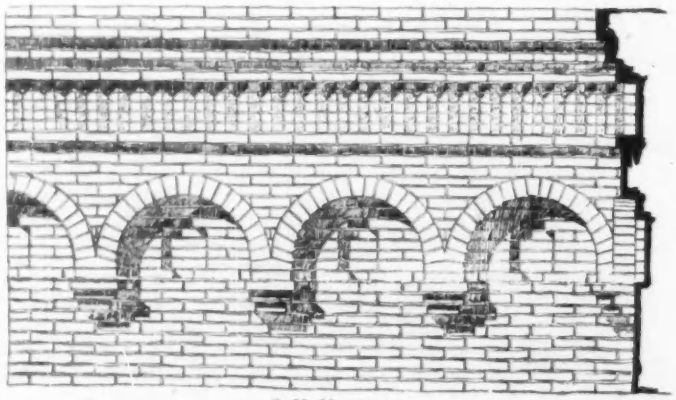
E. Lilienerantz.



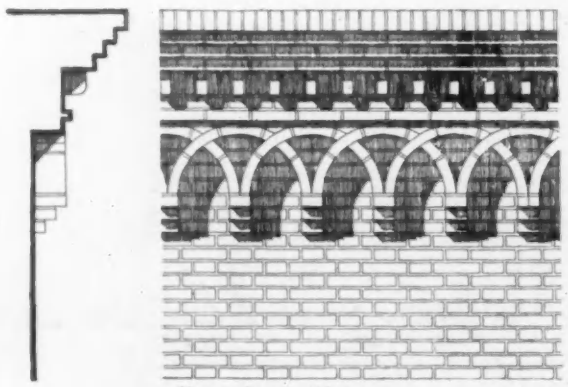
Arthur Francis Buys.



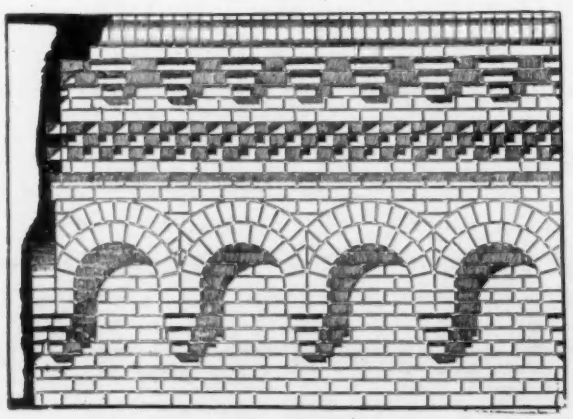
George B. Ford.



C. V. Merrick.



Harry Leslie Walker.



Lewis M. Lawrence.

The accompanying drawings of brick cornices are the result of the weekly exercise in design given the class in History of Ornament, at the Massachusetts Institute of Technology. It was required to use molded bricks only where necessary, keeping as far as possible to bricks of regular shape.

CHURCH OF "OUR LADY OF MERCY," BROAD STREET, PHILADELPHIA, PA. EDWIN F. DURANG, ARCHITECT.
Roofed with Celadon Roofing Tile supplied by O. W. Ketcham, Agent, Philadelphia.

expert jury, and the outcome is eagerly awaited by some dozen architects who have submitted drawings. The competition for the Maccabee Temple has resulted in an amusing fluke. The committee, after deciding that architect George D. Mason had "by far the best plan" and that "the others were not in it," agreed to disagree over the elevations submitted by Mr. Mason and by Malcomson & Higginbotham, and after a battle of words, lasting three hours, finally decided to employ both parties jointly to carry out a design. Messrs. George D. Mason and Malcomson & Higginbotham are, therefore,

UPPER PORTION STORE AND OFFICE BUILDING, INDIANAPOLIS, IND. VONNEGUT & BOHN, ARCHITECTS.
Terra-Cotta made by the Indianapolis Terra-Cotta Company.

DETAIL ON POST-OFFICE BUILDING, NEWPORT, KY.
Winkle Terra-Cotta Company, makers.

associated architects on this building, which will cost about $160,000.

George D. Mason and Alpheuse W. Chittenden are associated on some additions and changes to the interior

DETAIL EXECUTED IN TERRA-COTTA BY AMERICAN TERRA-COTTA AND CERAMIC COMPANY.

of the Masonic Temple, and Mr. Mason and Col. James M. Wood are associated in designing the new Empire Theater in Pittsburgh, which will cost $300,000. In architectural excellence, appointments, and conveniences it

PANEL BY ALBERT W. DILKS, ARCHITECT.
Excelsior Terra-Cotta Company, makers.

will surpass any theater of its class in America. It will be Empire in style, will have one balcony but no gallery, and will seat 2,500 people.

IN GENERAL.

On September 29, a meeting was held in Toledo, Ohio, for the purpose of organizing the Toledo Archi-

ORNAMENT FOR CROWN OF WINDOW.
New Jersey Terra-Cotta Company, makers.

tectural Sketch Club. The following officers were elected: President, W. A. Stevens; vice-president, Frank Hall; secretary and treasurer, George B. Rhine. It was decided to apply for membership in the Architectural League of America.

The Atlanta T Square Club was organized recently with twelve charter members, who represent the most progressive draughtsmen and young architects in the southern metropolis.

DETAIL BY CLINTON & RUSSELL, ARCHITECTS.
New York Architectural Terra-Cotta Company, makers.

COLUMN, HENRY L. OTTENHEIMER, ARCHITECT.
Northwestern Terra-Cotta Company, makers.

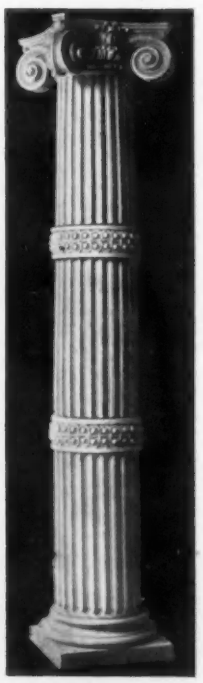
MISCELLANEOUS ITEMS.

The Standard Terra-Cotta Works at Perth Amboy, N. J., have resumed business.

The terra-cotta used in the new Union Station at Dayton, Ohio, illustrations of which are published in the plate-form for this number, was made by the St. Louis Terra-Cotta Company.

The Hartford Faience Company, Hartford, Conn., have opened an office in New York at 1123 Broadway. R. B. Ives is in charge.

Mr. W. D. Richardson, superintendent at the plant of the Ohio Mining and Manufacturing Company at Shawnee, Ohio, gives substantial evidence of his thorough knowledge of the burnt-clay business in all its phases, in the new book issued by that company, and edited by him, entitled "Manual for Brickbuilders." Within its covers there is contained a fund of information relating to the manufacture and use of burnt clay, especially brick, which will make it a valuable addition to the technical library of any architect or builder. The price of the work has been set at fifty cents, but, undoubtedly, it will be sent without charge to those who have been, or are likely to be, patrons of the company.



COLUMN, OSCAR L. McMURRY, ARCHITECT.
St. Louis Terra-Cotta Company, makers.

The National Fire-proofing Company have received the contract for the new Atlantic Mutual Insurance Building, Wall and William Streets, New York City, Clinton & Russell, architects.

The Powhatan Clay Manufacturing Company are furnishing their salt and pepper gray bricks for the new Union Station at Columbia, S. C., Frank P. Milburn, architect; also for the new City Hall at Columbia.

DETAILS BY GEORGE B. ROGERS, ARCHITECT.
Conkling-Armstrong Terra-Cotta Company, makers.

The Ludowici Roofing Tile Company, Chicago, has issued an interesting pamphlet in which is illustrated many new railway stations which have been roofed with their tile. These illustrations are of stations by Frost & Granger, Walker & Kimball, W. T. Krausch, Cass Gilbert, Shepley, Rutan & Coolidge, and C. A. Reed, architects.

THE ATELIER FITZWILLIAM, AUDITORIUM BUILDING, CHICAGO,

GIVES each month twenty-five cash prizes, aggregating $145, for the best designs in an architectural sketch competition. At the close of each month a list of the names and addresses of prize winners are sent to each competitor, together with a critical comment on the faults and merits of his own design. Any one can enter these competitions for $1 per month. Write for program of November competition, "A Two-story Oriel." We reserve the right to retain any or all of the prize designs, and when satisfactory reproductions of these are obtainable, a series of them will be sent to each competitor also.

MAIN STAIRCASE.

HALL.

HOUSE AT NEW CASTLE, PA.

RUTAN & RUSSELL, ARCHITECTS.

UNIV. OF MICH.

LIBRARY.

DINING ROOM.

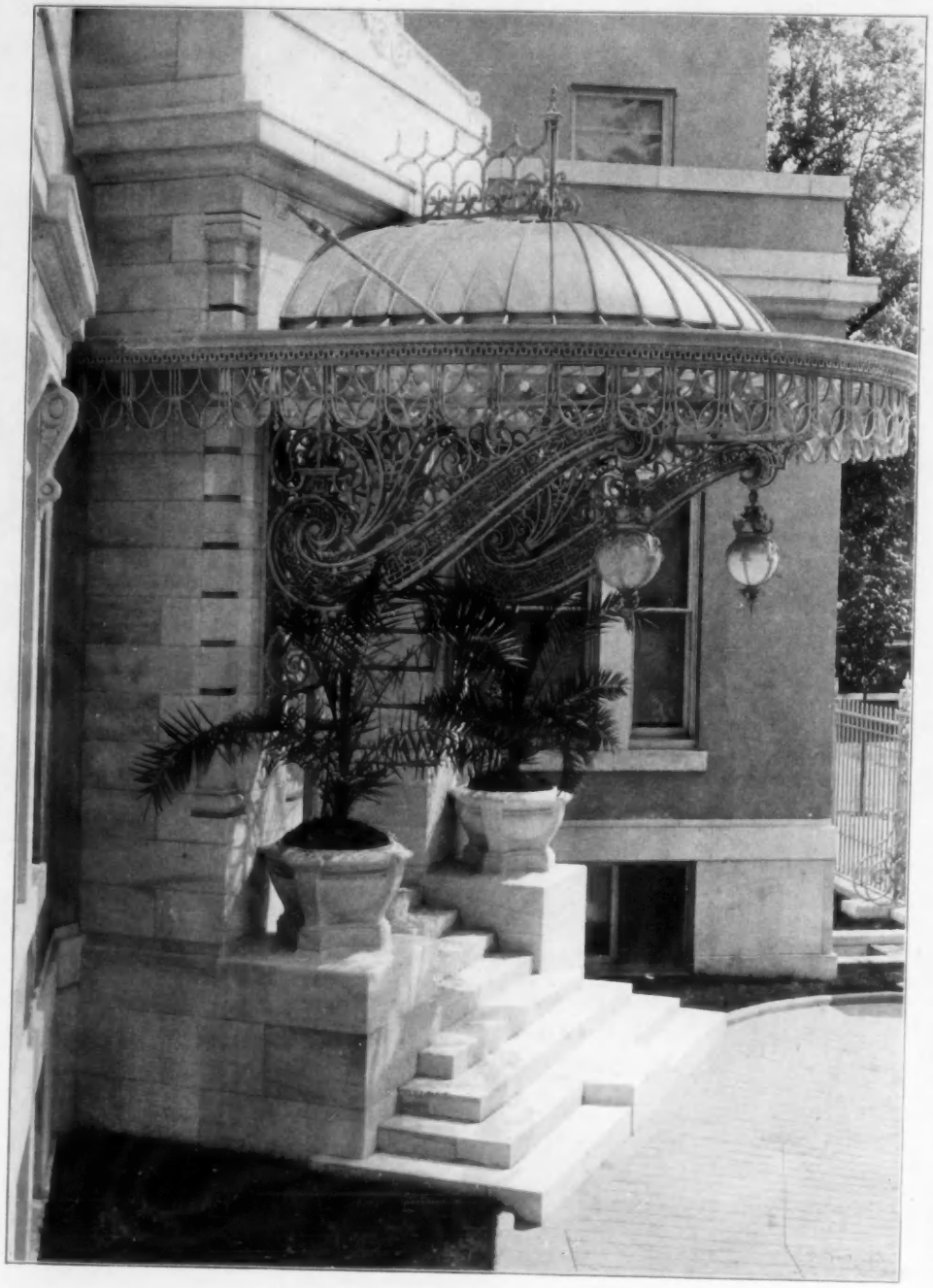
HOUSE AT NEW CASTLE, PA.

RUTAN & RUSSELL, ARCHITECTS.

UNION RAILWAY STATION, DAYTON, OHIO.

ELZNER & ANDERSON, ARCHITECTS.

UNIV. OF MICH.



MARQUISE AND NEW DOORWAY, OLD WISTACH MANSION PHILADELPHIA, PA

KENNEDY & KELSEY ARCHITECTS.

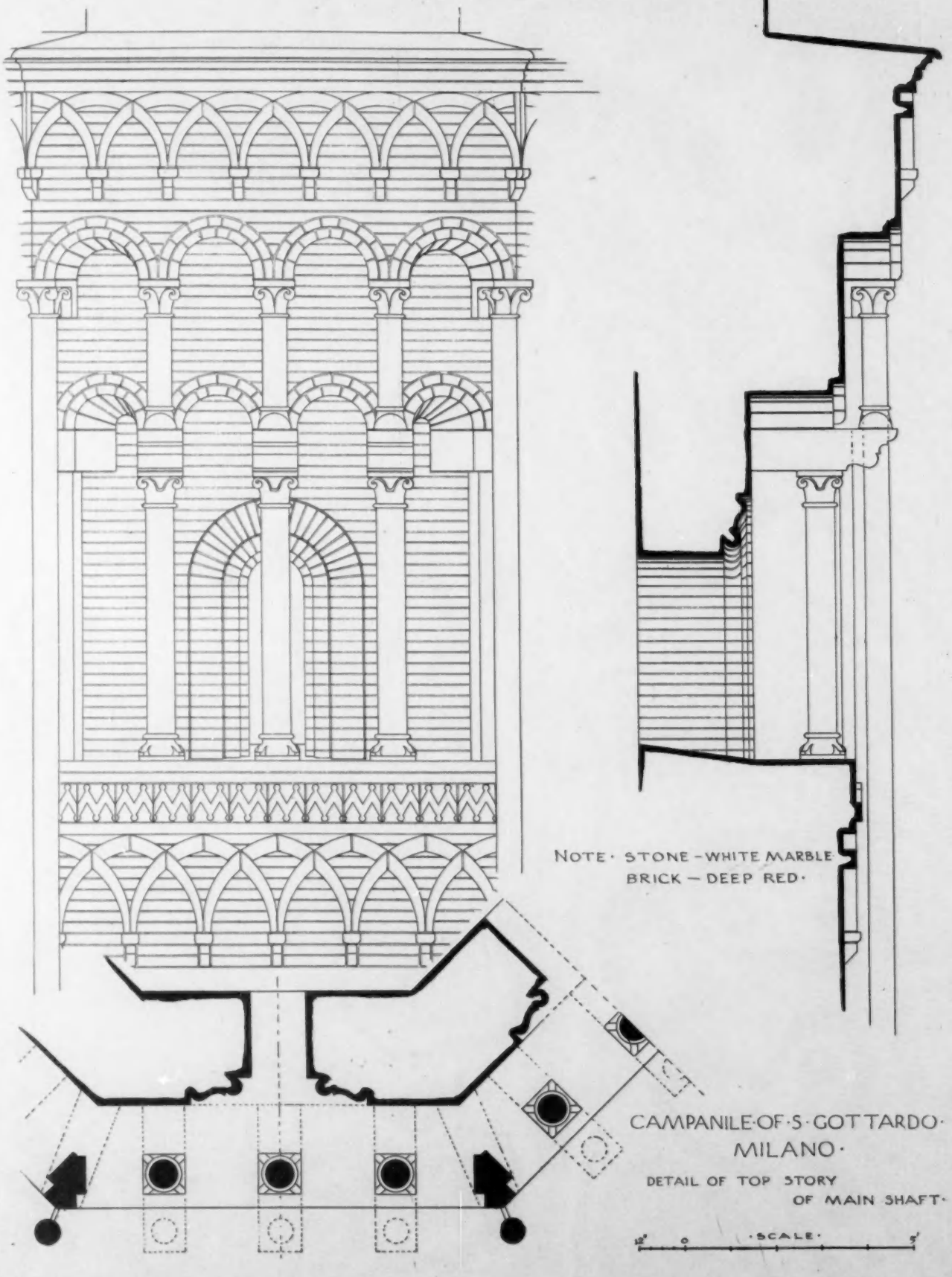
HOUSE AT NEW CASTLE, PA.

RUTAN & RUSSELL, ARCHITECTS.

THE BRICKBUILDER.
VOL. 9. NO. 10. PLATE 73.

DETAILS OF ITALIAN BRICKWORK

MEASVRED AND DRAWN BY WILL S ALDRICH

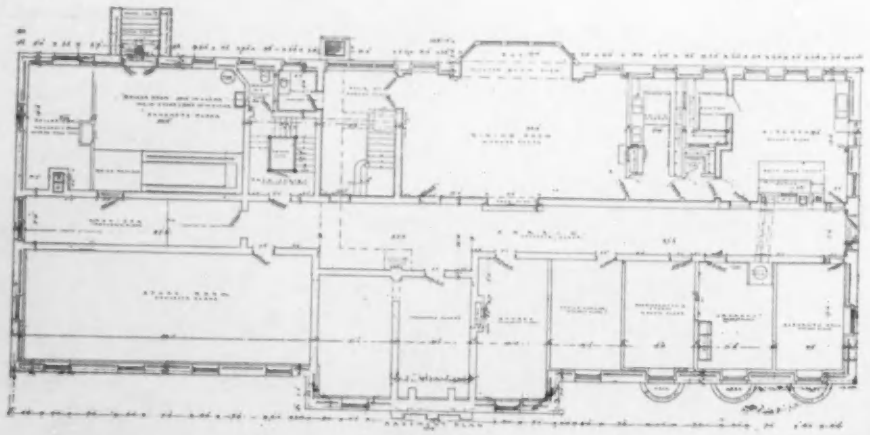


NOTE · STONE - WHITE MARBLE
BRICK — DEEP RED ·

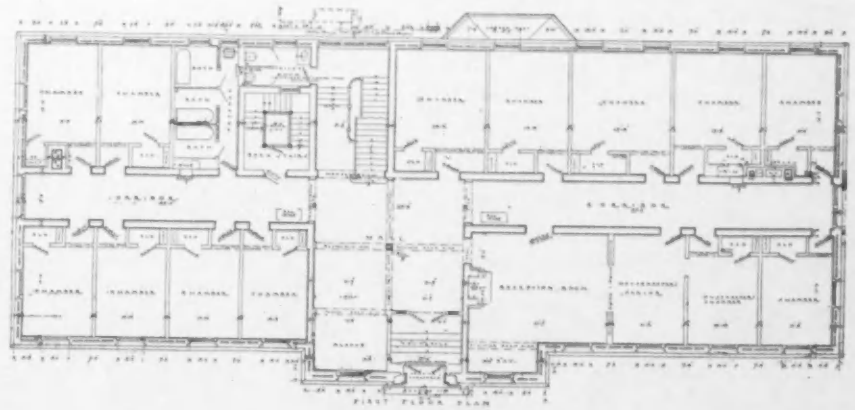
CAMPANILE OF S GOTTARDO
MILANO ·

DETAIL OF TOP STORY
OF MAIN SHAFT ·

12' 0 SCALE · 5'



BASEMENT.

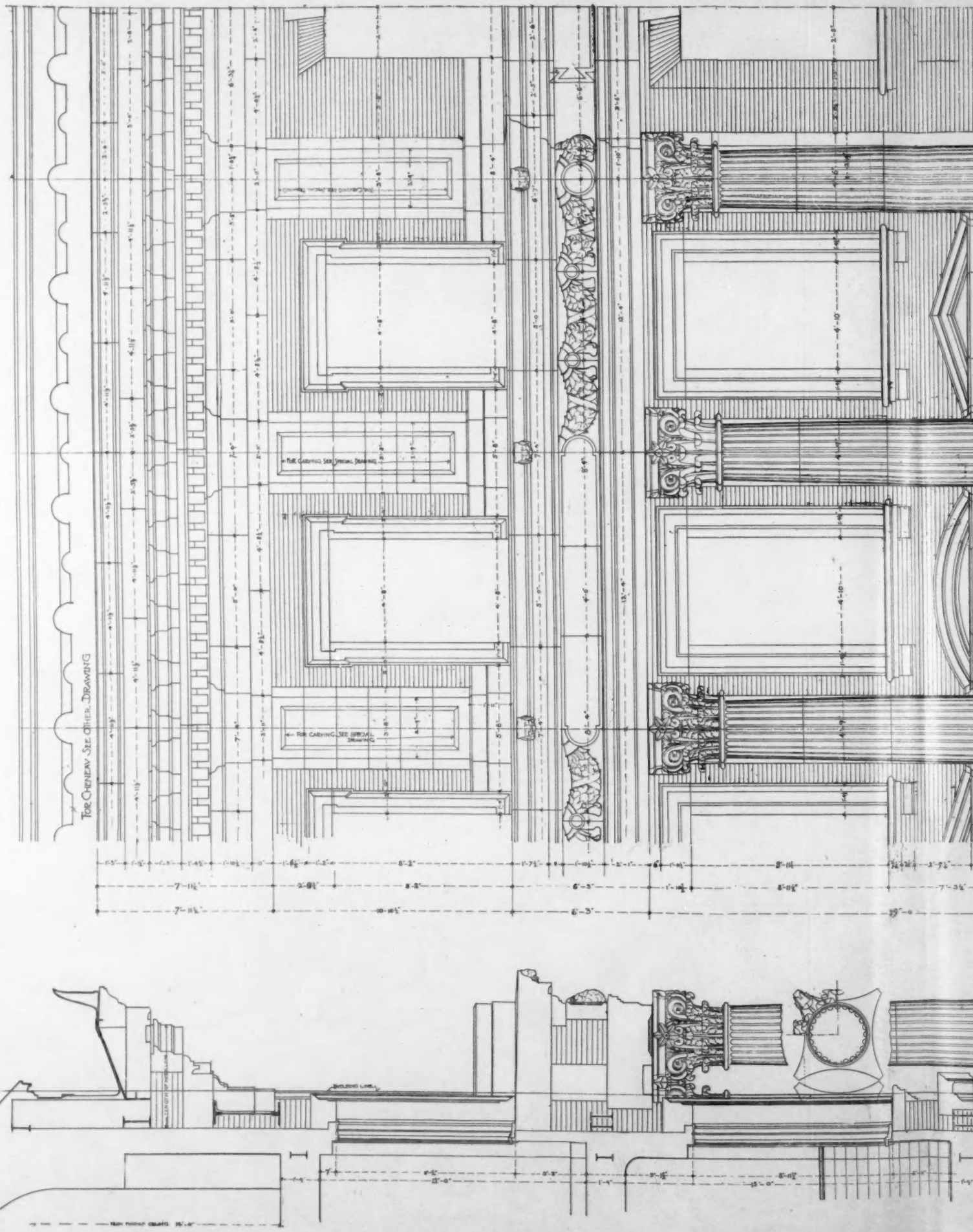


FIRST FLOOR.

·FRONT·ELEVATION·

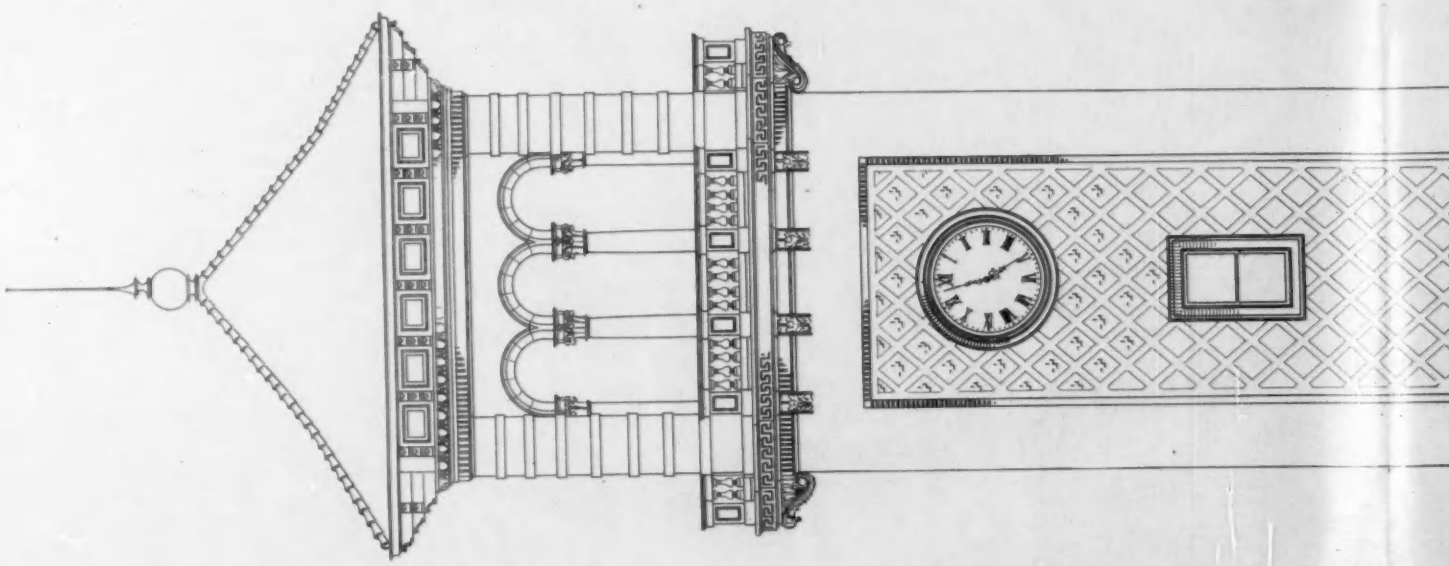
WILDER HALL. DORMITORY, WELLESLEY COLLEGE, WELLESLEY, MASS.

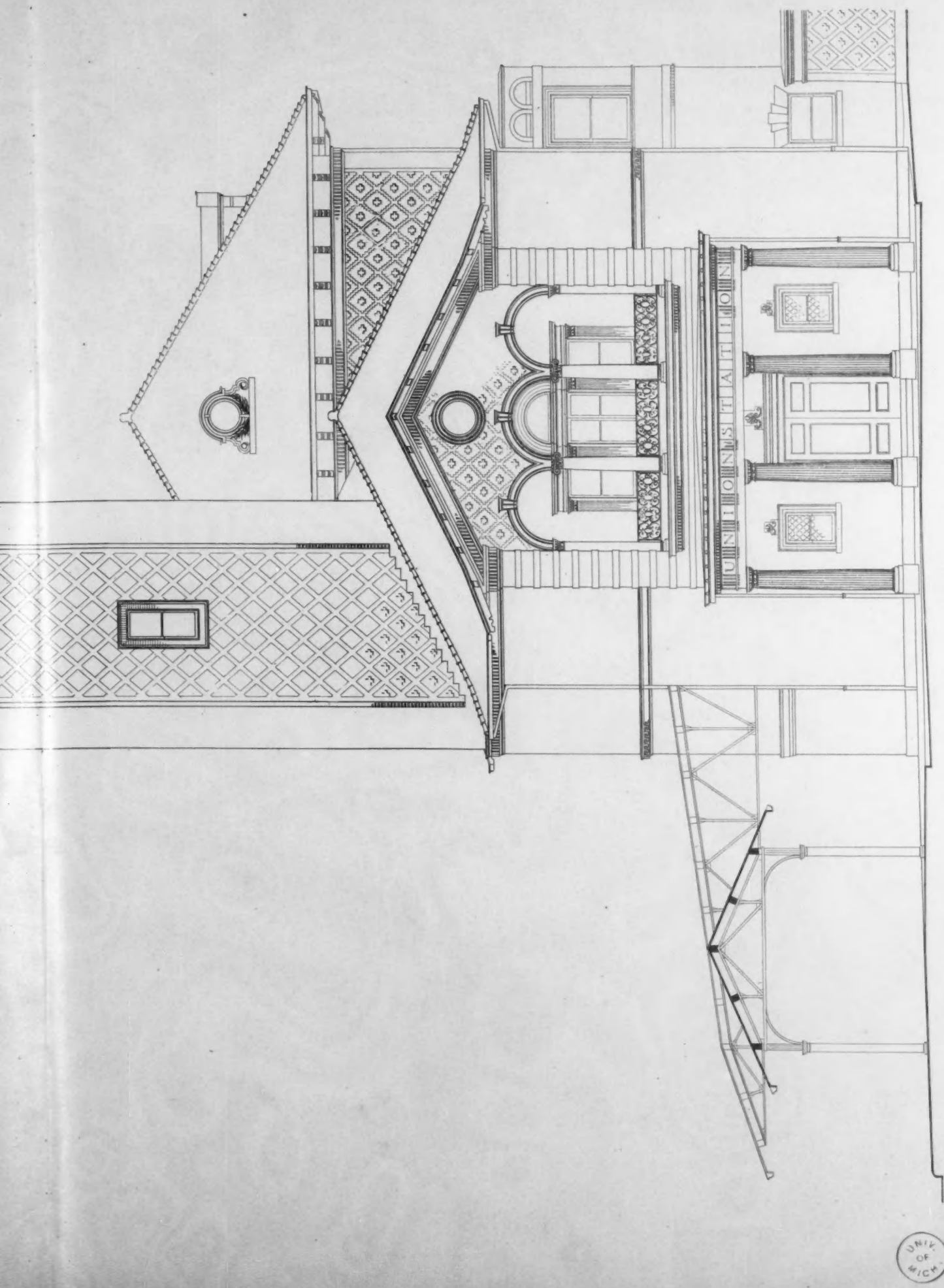
J. A. SCHWEINFURTH, ARCHITECT.


FOR CARVING SEE SPECIAL DRAWING
FOR CHENEAU SEE OTHER DRAWING
BUILDING LINE

DETAIL OF PAVILIONS, FRONT ELEVATION, CORNELL MEDICAL COLLEGE, NEW YORK CITY.
McKIM, MEAD & WHITE, ARCHITECTS.

THE BRICKBU
VOL. 9. NO. 10.



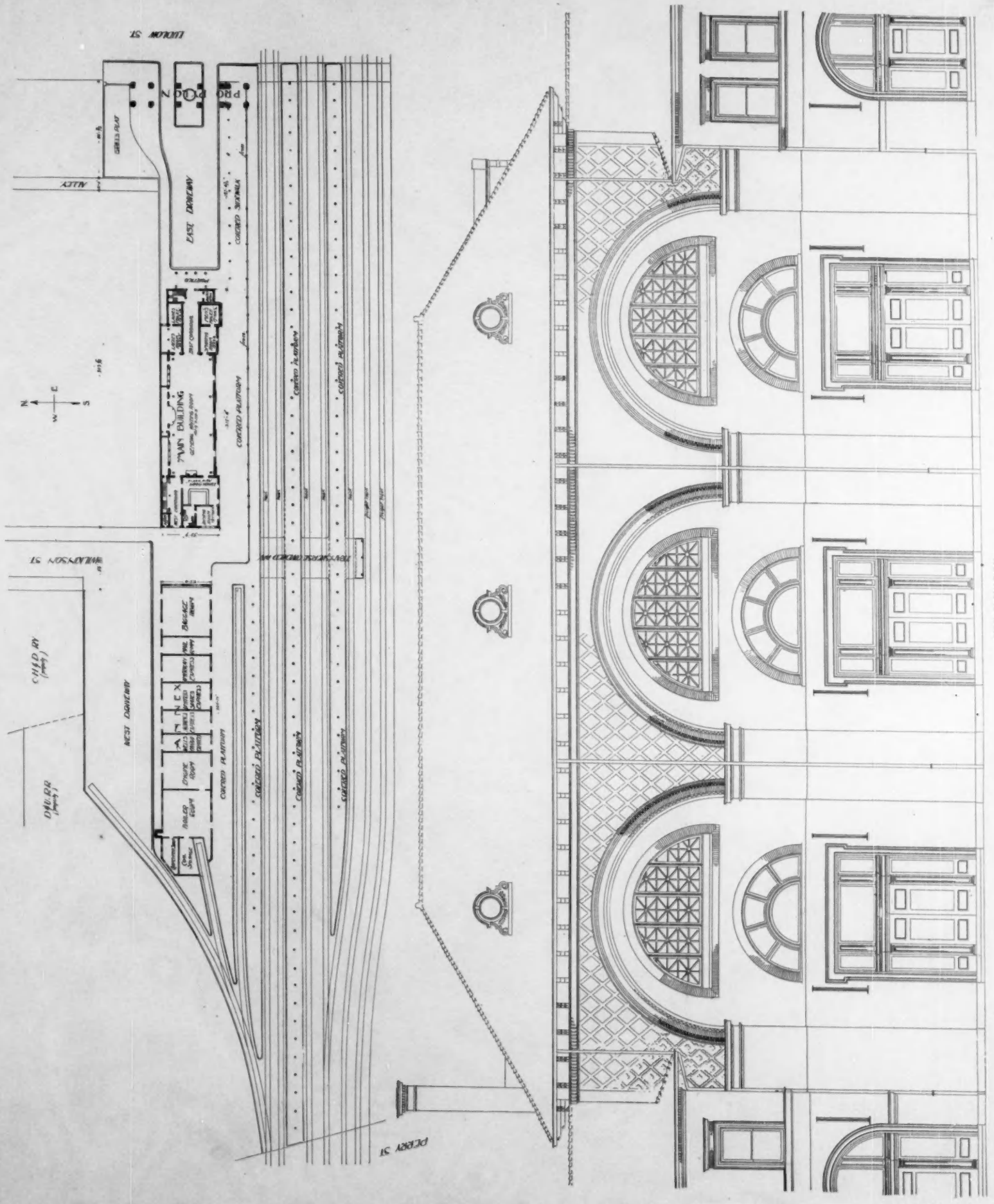


FRONT ELEVATION.

UNION RAILWAY STATION, DAYTON, OHIO.

ELZNER & ANDERSON, ARCHITECTS.

UNIV. OF MICH.



SIDE ELEVATION.

UNION RAILWAY STATION, DAYTON, OHIO.

ELZNER & ANDERSON, ARCHITECTS.

UNIV. OF MICH.

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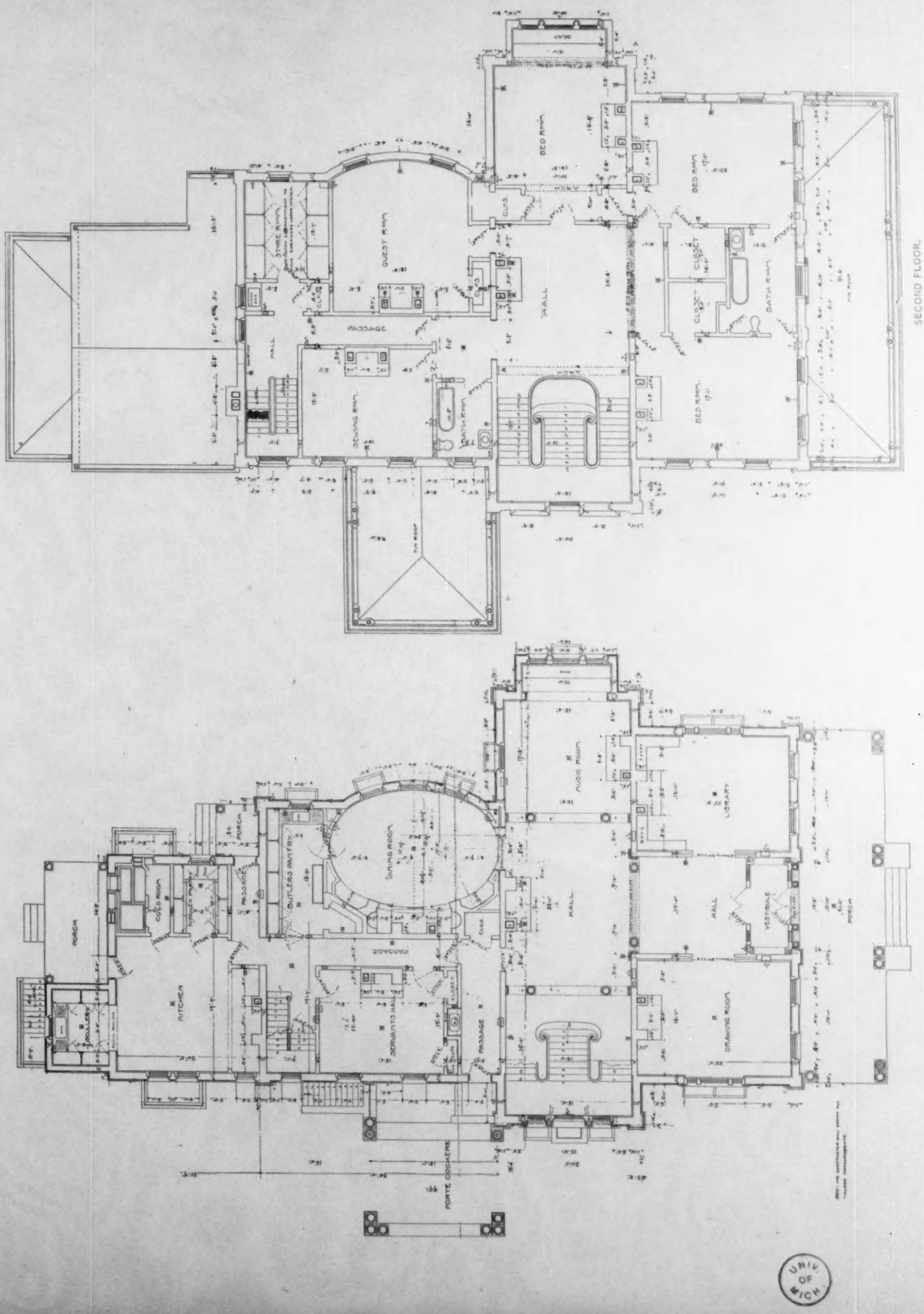

PLANS, HOUSE AT NEW CASTLE, PA.
RUTAN & RUSSELL, ARCHITECTS.

SECOND FLOOR.

FIRST FLOOR.

UNIV. OF MICH.